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94

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Our first look at Autodesk's exciting new software developments

KITBASH CONCEPTS

Mark Van Haitsma reveals the secret to great design

+

HOW TO MAKE IT AS A COMPOSITOR

PHOTOREALISM IN CINEMA 4D

WATER DYNAMICS IN REALFLOW

FIRE UP YOUR MODELLING

• 5 expert workflows • Pro sculpting & hard surfaces • Advanced techniques explored

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DI4D, Audiomotion and Remedy explain the awesome tech behind Quantum Break

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PRO TEXTURING FOR GAMES

Utilise ZBrush and 3ds Max to generate triple-A standard tileables

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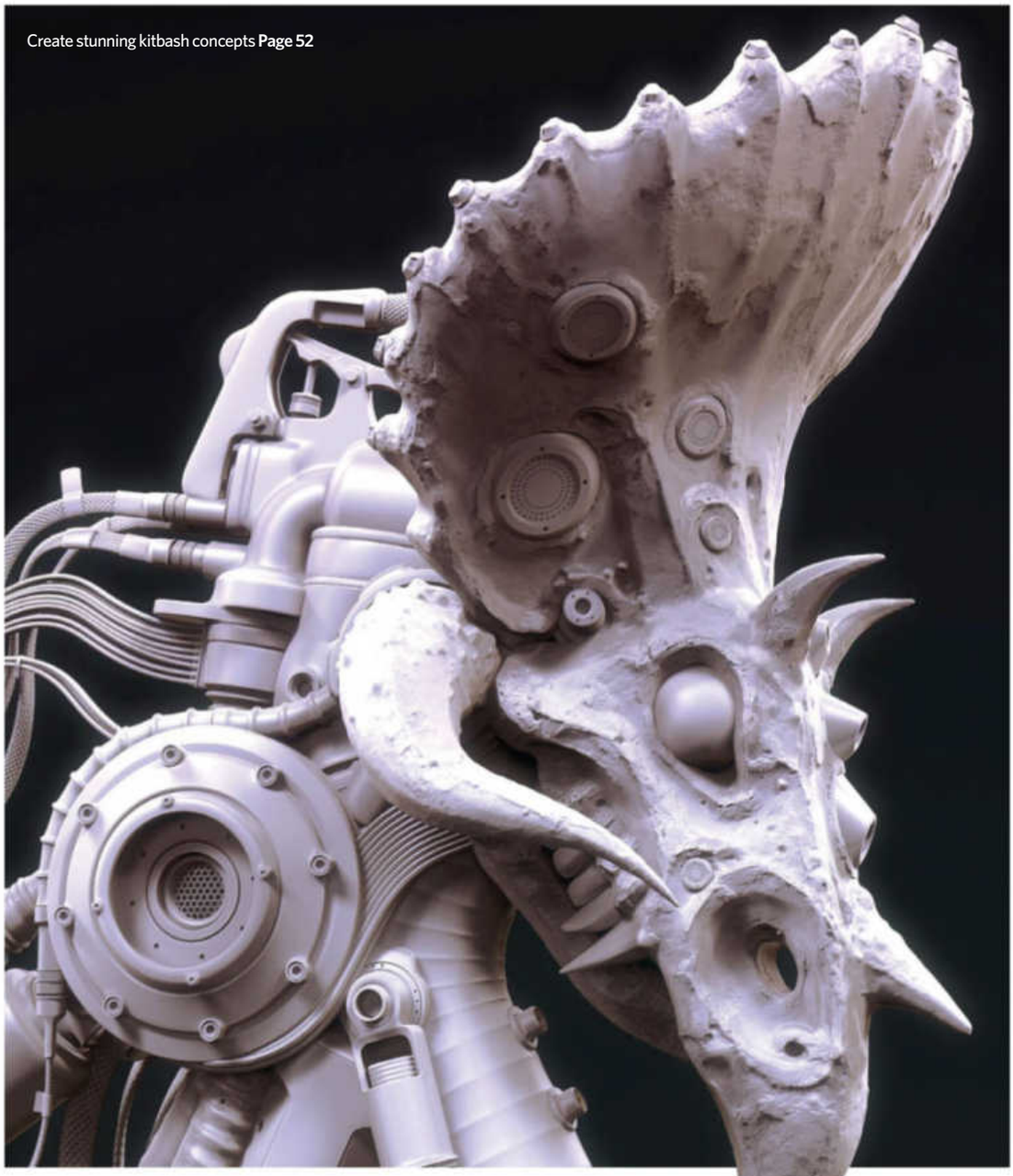
> My main philosophy is dare to be different. I always try to make something that hasn't been done before or create it differently

Hristian Ivanov explains his approach to creature sculpting **Page 24**

Fire up your modelling
Page 22

Hristian Ivanov
artstation.com/artist/hristianshyne

Software ZBrush, KeyShot, Photoshop


Create stunning kitbash concepts **Page 52**

Welcome

Thinking about it, one of the hardest parts of my job is planning. You all know how many different techniques, software solutions and communities exist out there, so how do we please everyone all the time? Alas, we can't, but we've given it a solid crack this month with features and tutorials that delve into every aspect of the 3D pipeline, starting with our fantastic cover feature on modelling. It's the stage where all the 3D mischief starts and is crucial for absolutely all of you to understand, even if you aren't an out-and-out modeller yourself, so give our expert projects a go.

Elsewhere, we've had a chat with Image Engine, Zero VFX and more about what it takes to be a great compositor, and DI4D, Remedy and Audiomotion show off their incredible approach to facial capture and animation for *Quantum Break*. Plus, we've got pro tutorials on kitbashing concepts, industry-standard tileable textures for games, Cinema 4D lighting, water dynamics and creating a broken glass effect with KeyShot and Photoshop.

Oh, and make sure you head to The Hub for info on the latest updates from Autodesk, and our fantastic interview with proof-of-concept savant, HaZ. Plenty for you to enjoy this month – let's get started.

Steve Holmes, Editor

Sign up, share your art and chat to other artists at **www.3dartistonline.com**

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Whether you need to pull a key, track objects, retouch images, animate titles, or create amazing 3D particle effects, Fusion has the creative tools you need! You get a true 3D workspace, the ability to import 3D models and scenes from software like Maya and 3ds Max, along with hundreds of tools for compositing, paint, animation and more!

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Fusion's GPU acceleration gives instant feedback while you work, so you spend more time being creative and less time waiting! Fusion 8 Studio also includes optical flow and stereoscopic 3D tools, along with unlimited free network rendering and tools to manage multi user workflows, track assets, assign tasks, review and approve shots, and more!

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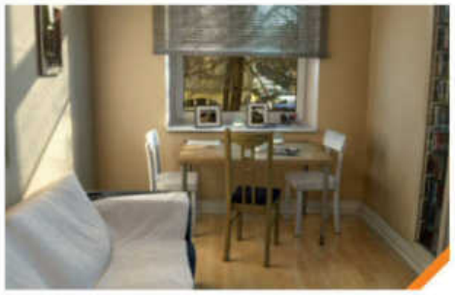
The Expert Panel

This issue's team of pro artists...

HRISTIAN IVANOV
artstation.com/artist/hristianshyne

We're always on the hunt for the best imagery and the best workflows, and Hristian's baby dragon really stood out when we were looking for modelling experts for our feature on p22.
3DArtist username n/a



MARC POTOCNIK
renderbaron.de

Many of you will likely rely on global illumination when lighting a scene – Marc is here to show you how to do away with GI and set up your own controlled lighting setup in Cinema 4D R17 on p44.
3DArtist username n/a

MARK VAN HAITSMA
artstation.com/artist/mvhaitsma

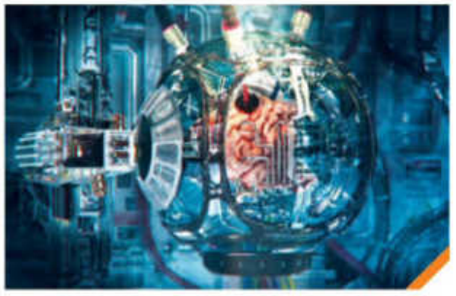
Kitbashing is a popular and useful procedure for generating concept art. Mark brings his experience in the games industry to **3D Artist** and shows you how to make your own quick concepts.
3DArtist username mvhaitsma

AYI SÁNCHEZ
artstation.com/artist/kratos

Many people in magazines would say we're mad for putting an image of a brick wall across two pages, but Ayi's is an astonishing example of tileable textures for games. Try it yourself on p58.
3DArtist username Kratos

VIKRANT DALAL
project01studio.blogspot.in

Water splashes are one of the most common things we see both in real life and in CG. Combine RealFlow and Liquid Hybrido though, and you'll get a distinct effect perfect for a rainy weather scene.
3DArtist username n/a



PABLO CASTAÑO NORKUS
facebook.com/eletecedateando

You don't always have to do things the hard way – often, if you're a concept artist it's best to be able to iterate quickly so you can react to feedback on the spot. Pablo shows off a neat timesaver on p70.
3DArtist username Ltcdata

PAUL CHAMPION
linkedin.com/in/pchampion

Following on from the latest release for 3ds Max, Chaos Group has launched V-Ray 3.3 for Maya. We asked Paul to cast a critical eye over all of the new features on p76.
3DArtist username Rocker

ORESTIS BASTOUNIS
twitter.com/MrBastounis

We're always conscious of getting a decent variety of workstations in the mag. This month, Orestis has taken a look at the Chillblast Fusion Atlas – one of the cheapest machines we've tested.
3DArtist username n/a

HASRAF 'HaZ' DULULL
hazfilm.com

Over on p84, we sit down with HaZ, a VFX artist turned director whose proof-of-concept projects have seen him make waves in the international movie business. He's someone to listen to.
3DArtist username n/a

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Contents

What's in the magazine and wh

News, reviews & features

10 The Gallery
A hand-picked collection of incredible artwork to inspire you

20 Technique Focus: The Shadow Paints the Earth
Johnny Malcolm breaks down his approach to topology

22 Fire Up Your Modelling
Whether you're just starting out or an old hand, these five workflows will get your creative juices flowing

32 The New Face of Motion Capture
We sit down with DI4D, Audiomotion and Remedy Entertainment to talk about the awesome facial capture in Quantum Break

38 Make it as a Compositor
Experts from Image Engine, Cinesite and more talk career paths and essential compositing techniques

72 Subscribe Today!
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74 Review: Chillblast Fusion Atlas
We cast a critical eye over the popular vendor's entry-level workstation

76 Review: V-Ray 3.3 for Maya
Find out what we thought of this latest update from Chaos Group

"If something is just not looking right, don't be afraid to make some drastic changes"

Mark Van Haitsma explains his approach to kitbashing concepts **Page 55**

52

Create realistic tileable triple-A materials

44

Create a water splash in RealFlow

66

Chillblast Fusion Atlas

74

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Turn to page 72 for details

It sounds complicated but this technique is easier than it seems
Pablo Castaño Norkus shows you how to mimic broken glass Page 70
70

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The Pipeline

44 Step by step: Photorealism without global illumination
Learn how to upgrade your lighting skill set in Cinema 4D R17 without resting on the crutch of GI

52 Step by step: Kitbash quick and simple concepts
Mark Van Haitsma reveals how to get the best out of kitbashing with clever post-production work

58 Step by step: Create realistic tileable triple-A materials
Sculpting and texturing a phenomenal brick wall for videogames made easy

66 Pipeline techniques: Create a water splash in RealFlow
Get to grips with the industry-standard fluids solution and simulate a realistic splash

70 Pipeline techniques: Render a broken glass effect in KeyShot and Photoshop
Six steps to help you manipulate different render passes and photography like a boss

The Hub

80 Community news
Blender connects to the Cloud and designer Brennan Letkeman explains how it can be used for product development

82 Industry news
We run through some of the major updates to Maya and 3ds Max that came out of NAB

84 Industry Insider: HaZ
The proof-of-concept mastermind talks about his career thus far and how anyone can make the leap from VFX to the director's chair

94 Readers' gallery
The very best images of the month from www.3dartistonline.com

The Gallery

Have an image you feel passionate about? Get your artwork featured in these pages
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Vincent Joyal
artstation.com/artist/joyal

Vincent works at Square Enix/ Eidos Montréal and has worked on environment art for 13 years

Software 3ds Max, Photoshop

Work in progress...

"This image was created for a university class I was taking at the Centre NAD (nad.ca). My goal was to depict a fictional city with different coexisting social classes. The architecture of the towering city was mostly inspired by a recent trip to Turkey"

Vincent Joyal,
The Tourists, 2015/2016

Mark Chang
artstation.com/artist/equinoz

3DArtistOnline username:
Equinoz

Software Cinema 4D, ZBrush, OctaneRender, Photoshop

Work in progress...

"This is a character in my sci-fi short film 'RETURN' and I'm trying some different textures/materials to make it look more elegant and create more cultural feelings"

Mark Chang,
Cloaker, 2016

Amir Cherni
behance.net/Amircherni

Amir is an interior designer with over ten years of experience in architecture

Software 3ds Max, V-Ray 3.2, Mudbox, Photoshop

Work in progress...

"I started working on this with the idea to create a Tunisian atmosphere, reviewed to match actual design rules. The idea was to show contemporary Tunisian identity and give a new impression of our culture. This project was made to test and tweak hair and fur presets for an online workshop"

Amir Cherni,
Tunisian Style, 2016

Dhanad Islam
dhanadislam.com

3DArtistOnline username:
killswitch

Software ZBrush, Maya, MARI, V-Ray

Work in progress...

"Growing up watching shows and films like Voltron, Jurassic Park, Robotech and the more recent ones like Pacific Rim helped inspire the design of Tombstone. Mechas and creatures? Yes please!"

Dhanad Islam,
Tombstone, 2016

Piotr Bieryt
bit.ly/244yWzJ

3DArtistOnline username:
McGavish

Software Blender, Photoshop, Perfect Effects 9

Work in progress...

"I got an offer from Reynante Martinez to be a beta tester for his Cycles Material Vault, so I decided to create a new scene using these materials. Concept for this scene comes from my friend Kamil Nowak. I would also like to mention that RenderStreet made it possible for me to render a hi-res image!"

Piotr Bieryt,
Clothespins, 2016

Timothy Steer
pairofmittens.com

Tim completed a master's in 3D Animation, and is working in children's TV as a modeller

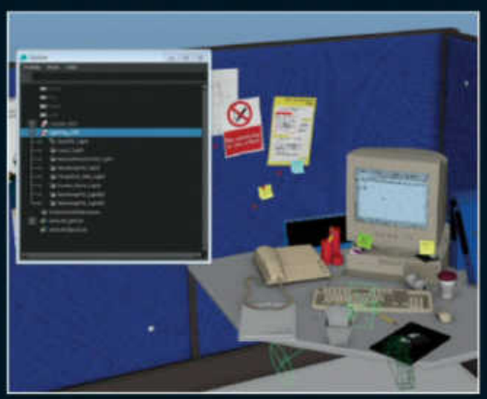
Software Maya, Photoshop, Redshift

Work in progress...

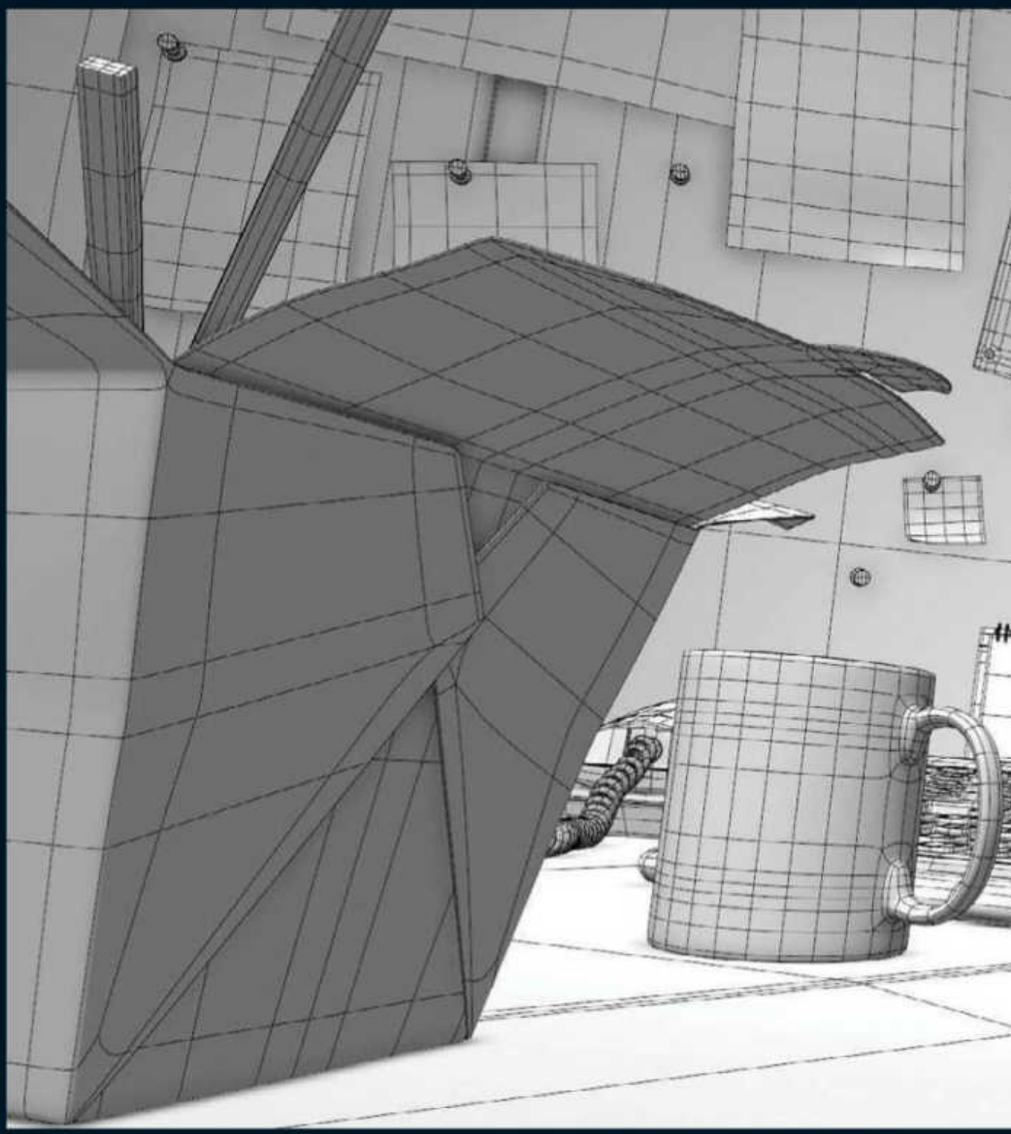
"I wanted to invoke that feeling many of us have experienced before – burning the midnight oil before a deadline, fuelled by caffeine and junk food as you power into the night. Set in the mid-Nineties, I created this scenario of an office worker staying late to get his report done for the morning deadline"

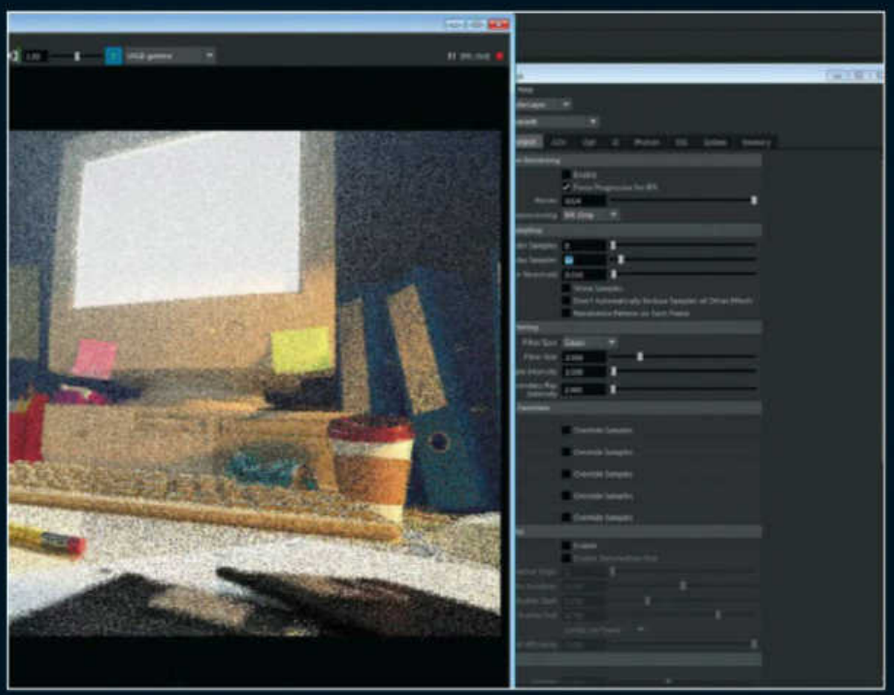
Timothy Steer, *Working Late,* 2016

> Small details make a difference. Imperfections add to the narrative and improve visual interest – there needs to be a balance between adding objects to better the composition whilst still maintaining the illusion of being naturally placed
>
> **Timothy Steer,** *Working Late,* 2016



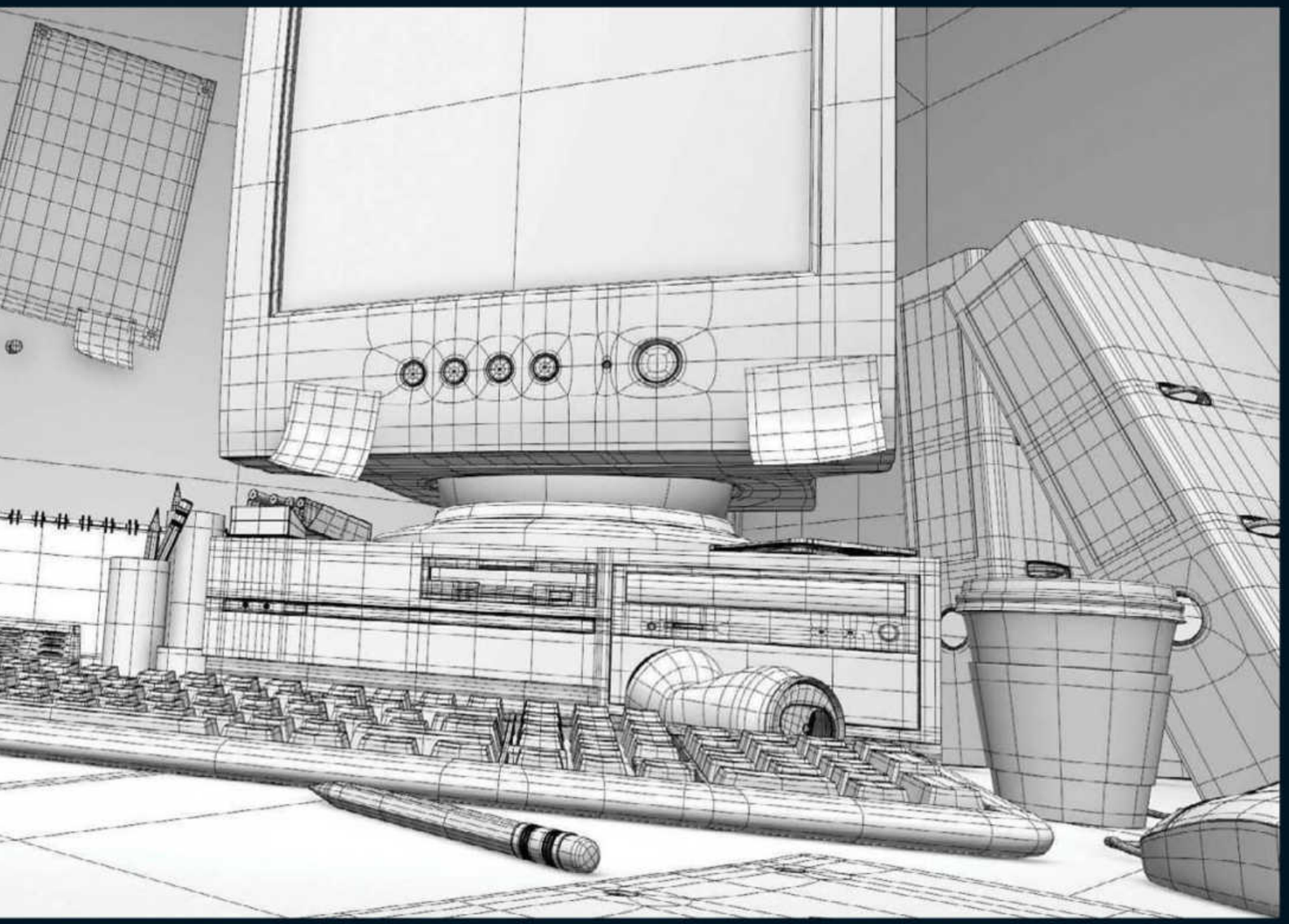
LIGHTING
ABOVE Lighting is a weak point of mine so I wanted to pay more attention to it for this piece. The final setup was pretty simple. I used a mesh light for the screen and a spotlight for the desk lamp. A couple of fill lights were used to illuminate some areas that were becoming a little too dark. Finally I added some fill and rim lights that only affected the take-away box and chopsticks to further focus the attention on that area.

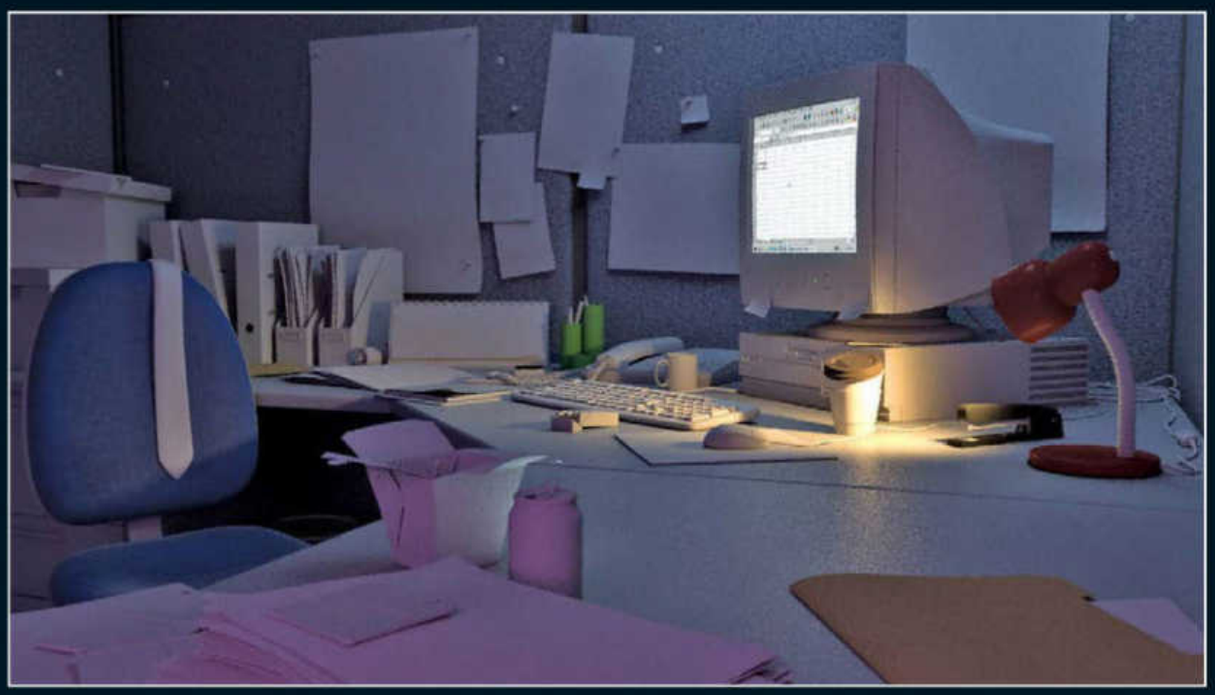




RENDERING
ABOVE This was my first project using Redshift and it sped up my look-dev workflow dramatically. I was able to use my two GPUs to full advantage; being able to tweak lighting and textures, with depth of field, GI and volumetrics in a matter of seconds rather than minutes. This enabled me to really get the look and feel of the piece within the renderer, minimising the amount of work I would usually do in post.

MODELLING
ABOVE I went into this project by modelling all the individual assets first before deciding on camera placement. I made sure that every object had enough detail to be viewed close up. I wanted to treat it like a real life set that I could place a camera in and take a photo. Although some of the models I created became redundant, it did give me a lot of freedom for set dressing as the objects didn't need to be altered even when placed directly in front of the camera.





ORIGINAL COMPOSITION
ABOVE I changed the composition multiple times until I was finally happy. The original camera view showed more of the environment but lacked appeal. Having the camera further away reduced the impact of the computer screen, which I wanted to be the main source of light. I opted to move the camera closer to make the screen more integral to the composition.

Technique focus

Incredible 3D artists take us behind their artwork

TOPOLOGY For the headdress pieces, I started with a subdivided sphere in ZBrush. From there I painted directly onto the surface using PolyPaint. I then chose Mask by Intensity in the Masking subpalette to get a clean mask to use Edge Loop Mask Border. After that I isolated that selection, deleted what I didn't need and ran Panel Loops on it to give it thickness.

Johnny Malcolm
artstation.com/artist/johnnyhalcyon

Johnny works as environment artist at United Front Games

Software ZBrush, Marmoset Toolbag, Substance Designer

The Shadow Paints the Earth, 2016

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FIRE UP YOUR MODELLING

3D Artist talks to master modellers to discover how you can professionally design, sculpt and perfect any model you want

Historically, modelling artists used to use clay to carve out their ideas and make them visceral, pulling and deforming the earth to bring their inspirations to life, cutting away and refining over and over until they had a sculpture they were happy with. The only thing that's changed in over 1,000 years are the tools: that core creative philosophy is the same.

Our expert guide to modelling aims to teach you that anything is possible. From hard surfaces to intricate organics – everything is achievable if you know how to manipulate the software you're using.

Modelling underpins every discipline of 3D art including arch vis, advertising, building game assets and working on 3D scenes for movies. You need at least a solid *understanding* of how modelling works if you want to work with 3D, as any of our experts in this feature will tell you.

From finding the best way to make hard surfaces look photorealistic to figuring out how to get the expression on your fictional monster *just* right to convey emotion and personality, modelling is the foundation of any great project.

We spoke to five modelling experts to find out what fuels their creativity, what tips they've got for helping you complete your projects, and what advice they'd give to anyone looking to upgrade their modelling skills today...

> "Use Transpose Master for posing; thanks to ZRemesher you can use a low-poly version of the model for easy posing"
>
> **Hristian Ivanov**
> *ON POSING THE BABY DRAGON MODEL AFTER POLYPAINTING*

EXPERT
Hristian Ivanov

PORTFOLIO
artstation.com/artist/hristianshyne

BIO
Hristian is a young artist with a passion for 3D, robots and cool shapes. His dream is to become a greater artist.

EXPERIMENT WITH NEW STYLES

Hristian Ivanov is a versatile 3D artist, always using new techniques to create inspiring models

How did you get your start in 3D?
I was into graphic design and illustration, I still am actually. My main tools were traditional media a couple of years ago and then slowly I transformed my work into digital illustration, graphic design, vectors and so on. I look at it as a new chapter of my art life. I love to experiment with media and I guess this was suppose to happen.

You have a very distinct style – what is your design philosophy?
My main philosophy is dare to be different. I always try to make something that wasn't done before or create it differently. Having a different perspective is also helpful.

Which tools do you use in your work and which brushes could you not live without?
I use ZBrush, KeyShot and Photoshop. I really enjoy utilising the Clay, hPolish, TrimDynamic and Standard brushes.

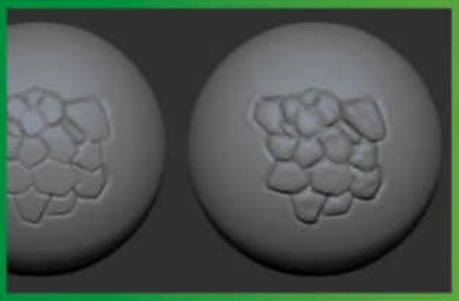
Finally, what advice can you give to readers that are interested in professional 3D work?
I don't consider myself as a professional. I still have a lot to learn and long way to go. I'm just an enthusiast. But if I have to answer the question, my advice will be to never give up, work harder and never stop dreaming.

> I use ZBrush, KeyShot and Photoshop. I really enjoy utilising the Clay, hPolish, TrimDynamic and Standard brushes

HOW TO PAINT YOUR DRAGON

01 **Find the right shape for the dragon** First, start with ZSpheres. With these volumes in place, you will be able to easily imagine the shapes of the model that you are making. For the creation of fantasy creatures and animals, this method is the easiest way for you to start and to visualise your project.

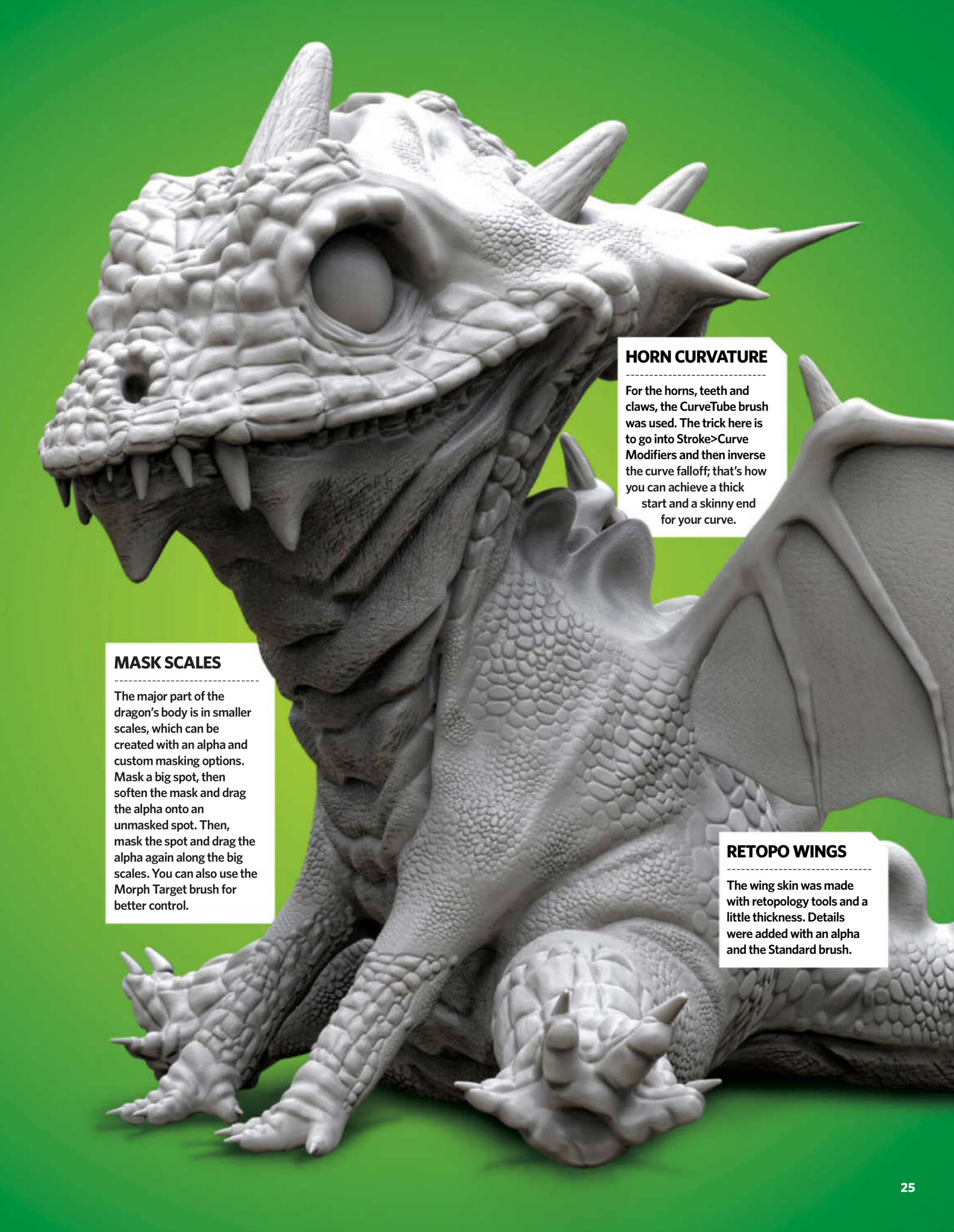
02 **Refine the model** Make your base and DynaMesh it. Then you can start tweaking and pulling the main shapes of the dragon, following some references you may have to hand. Start with the Move brush and Clay brush for blocking the shapes. You can break the character's main pieces into polygroups for easier navigation.



03 **Go into detail** Once you're satisfied with your DynaMesh model, take it to ZRemesher for retopology. With the lower-poly mesh, you can define better proportions using the Move brush. Once everything is perfected, then you can start detailing. Utilise Clay, ClayTubes and Standard brushes for details using different alphas.

04 **Focus on features** For the scales, draw the shape with the Dam_Standard brush – start doing the details on the highest subdivision level. Use a lot of references, but don't be afraid of stylising and going for a cartoon dragon. After drawing shapes, utilise Clay or ClayTubes to add depth. Then use hPolish or Trim to flatten them.

05 **Polypaint the dragon** The next step is to polypaint (you're going to want a lot of reference here, too!). You can paint with a variety of different techniques to achieve realistic skin colours on any fantasy character. Use Transpose Master for posing; thanks to ZRemesher you can use a low-poly version of the model for easy posing!



HORN CURVATURE

For the horns, teeth and claws, the CurveTube brush was used. The trick here is to go into Stroke>Curve Modifiers and then inverse the curve falloff; that's how you can achieve a thick start and a skinny end for your curve.

MASK SCALES

The major part of the dragon's body is in smaller scales, which can be created with an alpha and custom masking options. Mask a big spot, then soften the mask and drag the alpha onto an unmasked spot. Then, mask the spot and drag the alpha again along the big scales. You can also use the Morph Target brush for better control.

RETOPO WINGS

The wing skin was made with retopology tools and a little thickness. Details were added with an alpha and the Standard brush.

> Practise, practise, do your work and don't give up. It sounds so simple, but it's the most important advice that I can give

EXPERT
Mateusz Szulik

PORTFOLIO
matszulik.com

BIO
An illustrator and 3D artist that's worked in videogames, animation and advertising, Mateusz is becoming increasingly well known for his distinctive low-poly projects.

MASTER LOW-POLY MODELLING

Mateusz Szulik reveals how he utilises noise modifiers and high-poly renders to help him create a beautiful low-poly art style

How did you get into 3D?
As a kid I always wanted to make games. This desire transformed from 'making games' into 'making cool art' over the years. Having only a few (really crappy) 3D renders I got my first job at an advertising agency in Poland, where I got an amazing skills boost and learned a lot from the great people working there.

After over four years of working for big Polish and international companies at this agency, and working on personal projects in the evenings, I left the advertising agency and started working as a freelancer for the videogames and advertising industries.

As your style developed, what made you want to create low-poly artwork?
I think that a unique and recognisable style is an extremely important aspect in every freelancer's career. I was always into highly-stylised illustrations (that doesn't mean I don't like realistic artworks – I love them as well, especially realistic sci-fi stuff) but three years ago I never thought I would be making so many low-poly illustrations in the future.

After my first low-poly project Power Giants got featured and gained a lot of exposure, I started receiving more and more low-poly commissions (not only illustrations, but videogames and animations as well!) and my low-poly style started evolving. And the best thing about all of this is that low-poly art is not only quite popular now, but working in that style is super fun!

Which tools do you use in your work and why?
I use 3ds Max for modelling and V-Ray for rendering. This is something I learned a lot of years ago, so I used them because I knew them. I know most (or at least huge numbers of) people use Cinema 4D for low-poly work, but I never had a chance to try it. I am experimenting with MODO now and I am trying to put it in my modelling workflow because it's a great tool.

You've worked with several clients – what's the project that you're most proud of?
Well there are two projects I am especially proud of – the Power Giants, because it was the first one and it started my low-poly adventure, and the second one is the illustration series I did for Etihad Airways.

The Eithad Airways project was huge and also super professional, so I had a great chance to push my low-poly style further and further. Because I had to drop the cartoon style and achieve a 'premium' look for the illustrations, I had to rework my lighting and shaders.

Can you explain a bit about your low-poly modelling workflow?
My low-poly modelling workflow consists of two processes. Parts of the models are modelled directly in low poly, especially as each edge has to be carefully placed – this is very important for the final design. And then I use some noise modifiers at the end to give it more randomness. But most of the objects are made high poly first, then some noise is applied and optimised (first via automatic optimisation and then by hand at the end). In both cases the noise modifier is really important – it gives a more natural look and often makes a huge difference.

Finally, what advice can you give to readers that are interested in professional 3D work?
Well, practise, practise, do your work and don't give up. It sounds so simple, but it's the most important advice that I can give that works.

Also, try to find a fun or interesting part in every project you do. Even boring projects can come out really great and valuable if you try to apply something fun or something you are really interested in, even if it is something really small. And the last thing – never stop learning. New tools, new techniques, new styles or workflows can sometimes give you a great creativity boost or even change your career path!

PERFECT DETAILING

Desmond Man started making this chair as part of a study into decorative patterns, planning in Photoshop and then moving into 3ds Max. This ornate model was textured within Substance Painter, which he heavily recommends to any artist. This model is generally clean so texturing did not take too long.

UPPER CHAIR ORNAMENT

The ornament was actually modelled separately to the frame, considering the seam would be masked through the baking process. I drew out a template based on my original source reference in Photoshop, which I then used as a tracing template to build a subdivided mesh on top of.

LEATHER BACKING

I began modelling this section out from the indents in the seat, I then duplicated that piece and laid them out to fit the padding shape. I used Bend/FFD modifiers to shape the curvature of the chair and I later brought it into ZBrush for more organic details.

CHAIR SEAT FRAME

I started with a subdivided mesh that I bent to fit the curvature of the seat backing. Once I was happy with the placement I began detailing the bottom of the frame. I built the details out flat thanks to the Bend modifiers, which made this much easier to control.

EXPERT
Desmond Chi-Chui Man

PORTFOLIO
desmondman.co.uk

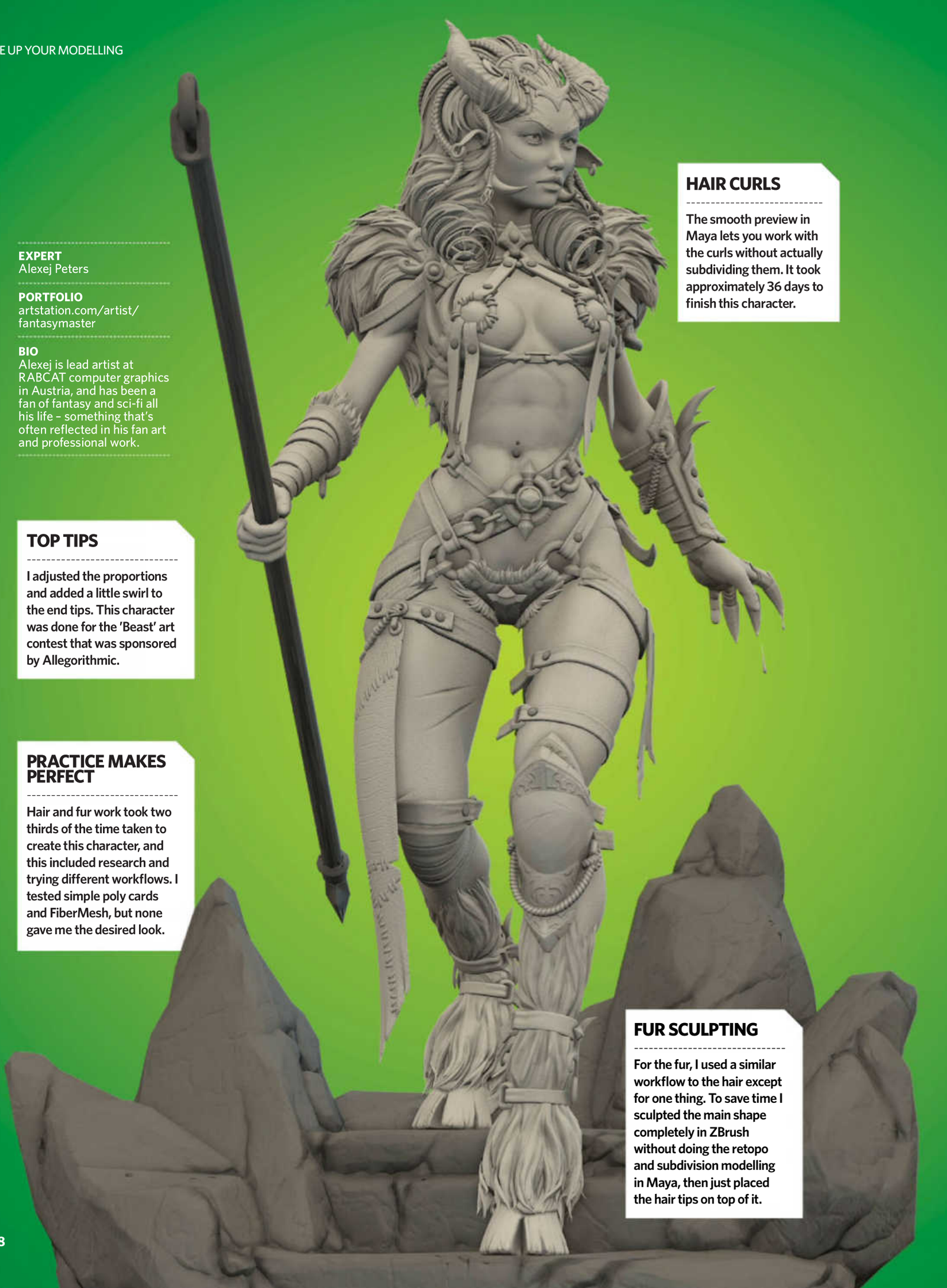
BIO
Previously working at Eurocom Developments as an environment artist, Desmond ventured into Hong Kong for three years and worked on mobile game *Chronos Gate* for Madhead Apps, before moving back to London as a freelancer.

CHAIR LEGS

This piece started as two separate models. The centre ornament was completely modelled in 3ds Max, but the leg frame started off in Max and was then migrated into ZBrush for fine details. I then retopologised the leg frame and combined the front ornament into it for a clean subdivided finish.

CHAIR ARM STAND

This piece was tricky and required a rough blockout in 3ds Max, which I then imported into ZBrush for further block-out sculpting using DynaMesh. Doing this gave me much more control over the floral details. I then retopologised it back in 3ds Max for subdivision smoothing to create clean-cut results.



EXPERT
Alexej Peters

PORTFOLIO
artstation.com/artist/fantasymaster

BIO
Alexej is lead artist at RABCAT computer graphics in Austria, and has been a fan of fantasy and sci-fi all his life – something that's often reflected in his fan art and professional work.

TOP TIPS

I adjusted the proportions and added a little swirl to the end tips. This character was done for the 'Beast' art contest that was sponsored by Allegorithmic.

PRACTICE MAKES PERFECT

Hair and fur work took two thirds of the time taken to create this character, and this included research and trying different workflows. I tested simple poly cards and FiberMesh, but none gave me the desired look.

HAIR CURLS

The smooth preview in Maya lets you work with the curls without actually subdividing them. It took approximately 36 days to finish this character.

FUR SCULPTING

For the fur, I used a similar workflow to the hair except for one thing. To save time I sculpted the main shape completely in ZBrush without doing the retopo and subdivision modelling in Maya, then just placed the hair tips on top of it.

SCULPT HAIR FOR CHARACTER CONCEPTS

01 **Get the shape right** Begin to sketch the volumes and rough proportions for how the hairstyle should look. Use any sculpting tool for this while indicating how the hair flow should be, but keep it simple without adding too many details. Then retopologise: I used Maya's Quad Draw tool for this. Now we need nice topology. The mesh should then be ready for subdivision.

02 **Add layers** A couple of different curls will be created and placed as a second layer after subdividing the mesh underneath. The curls should not intersect each other though. Model the pigtails from one duplicated segment in a row, then model the ends using the curl parts. To place them on the head, I used Maya's Wire Tool.

03 **Perfect details** In order to save some time, do the curls symmetrically first. Afterwards add a couple of additional curls to break up the symmetry. If you are happy with the hairstyle then it's time to add some final details in ZBrush. Utilise the Dam_Standard and Pinch brushes to add some thinner strands. The lazy mouse feature can help to keep the strokes nice and even. After that, you can start working on retopology and baking.

SIMULATED HAIR ISN'T ALWAYS BETTER

Alexej Peters explains the benefits to sculpting your own hair and fur

What advice would you give to readers that are interested in pursuing professional 3D work?
Don't waste your free time on games and beer. Your education is just the beginning. There are always more to learn more than what the best schools in the world can offer. Be passionate and work hard, no matter what education you have. Many new tools and workflows appear every day. Make an effort to get familiar with them and always look for better and faster methods. Be part of online communities. There are many great forums where people are willing to help you to achieve your goal. If you want to create great art, never copy what already exists. Experiment with new things and create your own great piece.

How and why did you get into visual effects in the first place?
After graduating from school I did a profession-finding test to find out what kind of skills I have. The result was that I am creative and have designer talents. So I visited a graphics design college and did a diploma for graphics design afterwards. During this time I realised that 3D art and visual effects appealed to me the most.

Which tools do you use in your work, and why?
I am using Maya for almost everything, I really cannot tell you why. Probably because I am used to it, since I have used it for over ten years now. Maya has some great modelling tools and the best usage for custom scripts. I also use ZBrush for sculpting and Mudbox for painting textures.

Why did you choose to model the hair, rather than use hair and fur tools?
Simulated hair looks better and more realistic of course. But I wanted something more stylised and artistic for this character since the overall proportions of the model are exaggerated and stylised. Also I tried to avoid any kind of alpha transparency for my textures because it is very difficult to make it look good in most real-time engines. Working with simple polygons enables you to be creative and requires less technical knowledge of CG hair.

> "Don't waste your free time on games and beer. Your education is just the beginning. There are always more to learn more than what the best schools in the world can offer"

BUILD PHOTOREAL HARD-SURFACE MODELS

Tim Bergholz gives us five explosive tips on hard-surface modelling, by paying particular attention to real-life items and geometry

ANNOTATED REFERENCES

Extensive reference research is key to creating convincing-looking art and should always mark our first step. Ideally you'll find a schematic view with all parts of the object named, enabling us to further refine the search to those individual elements. Scan Wikipedia for the right sizes and try finding videos on YouTube to see it in motion. The more you know about your object the better.

BLOCKING IT OUT

Put the focus on the main shapes and silhouette as you start modelling. Don't get sidetracked by complicated details, the less polys you add initially, the more flexible you are for defining a robust base version of your object. Once you're happy with it, continue to further tessellate the geometry and start working on the smaller areas.

EDGE CREASE

In order to get the best normal map results it's good practice to bevel high-poly edges a slight amount higher than one that may appear realistic. If the edge crease is too hard there won't be enough normal map information on our texture, resulting in a look that's too sharp. In order to prevent that, you want to make sure that you get enough pixels filled with curvature information.

FLOATERS

Adding floaters usually marks the end of high-poly modelling and enables you to add small details without having to cut or extrude them into your actual high-poly object. Floater geometry gets placed right in front of the high-poly model: these can be details such as bolt heads, screws or engraved text, which would otherwise be a nightmare to model in.

EXPERT
Tim Bergholz

PORTFOLIO
chamferzone.com

BIO
Tim Bergholz is a senior artist at Ubisoft and creator of the ChamferZone tutorials that helps aspiring 3D artists.

UNWRAPPING

In order to prevent zigzagging steps on baked maps, it's of the utmost importance to straighten the UV border edges as much as possible in vertical and horizontal positions. For hard-surface texturing it's better to have straight-edged UV islands with a slight amount of distortion than the other way around. The normal map will thank you for it!

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THE NEW FACE OF MOTION CAPTURE

DI4D, Audiomotion and Remedy Entertainment walk Dom Peppiatt through Quantum Break's game-changing approach to mocap

Videogames and cinema are merging. Interactive experiences and straight-up Hollywood blockbusters still have their differences, but they both share one vital part – one part that's at the middle of every good story that's ever been told: the characters. **3D Artist** goes beneath the skin with Remedy Entertainment, DI4D and Audiomotion to figure out exactly how motion capture is evolving to fit into this new mixed media industry, and how on earth you make digital doubles feel more *human*.

A year or so ago, there was a threat of a strike in the videogames industry: a strike organised by voice actors who felt that they weren't getting the recognition that they deserved. Whilst the strike was never carried out, there was a shift in the way that things work: we're now seeing actors themselves appear on screen, in one way or another, through motion capture and the creation of digital doubles. Popularised by games like *Call Of Duty* (which featured a lifelike rendition of Kevin Spacey), *Star Citizen* and the most recent triple-A release *Quantum Break* – from Remedy Entertainment – we're seeing more and more studios opt to make A-list actors take centre-stage in their games.

Motion capture and lifelike performances aid in storytelling, in letting the viewer/player associate with their on-screen avatar. It helps the actor get their skills out to an audience that otherwise wouldn't see what they're capable of. But most of all, it's a great excuse for motion-capture studios and game developers to show off the new technology that they've been perfecting. But how exactly does it work?

"Most facial-performance capture systems either capture a single video stream, which is interpreted to drive a rigged character model, or capture the 3D trajectories of only a sparse set of discrete facial markers," explains Dr Colin Urquhart, founder and CEO of DI4D – the motion-capture studio behind the newest game to focus on lifelike digital doubles: *Quantum Break*.

"By contrast, the DI4D facial performance capture systems acquire a '3D scan' per frame using passive stereo photogrammetry, then a dense mesh is tracked through the sequence using optical flow. Every vertex in the tracked mesh then effectively becomes a motion-capture marker. The result is much higher fidelity data, capturing much more of the subtlety and nuances of facial performance and expression."

As games and VFX-based TV shows continue to push for quality, delivering lifelike reactions from actors is becoming a priority, and the fairly vague ways of capturing facial data that used to be the norm are becoming obsolete.

"Many projects we work on involve 'digital doubles' – virtual versions of real people. In order to create a 'digital double' of a real-life person it is necessary to obtain a realistic static 3D graphic representation of them. In theory an artist *could* sculpt such a 3D graphic representation, but in practice some kind of 3D scanning process is required to obtain the necessary level of detail, realism and likeness," explains Urquhart.

Getting the live performance data is only the first part of the mocap pipeline

This head-mounted camera from DI4D is a great solution for detailed, high-quality facial capture

The more points of reference you can generate, the more real the final product

"We partnered with Dimensional Imaging early on for facial animation since we were concerned about the quality and turnaround time of the FACS rigs we had looked into during the greenlight stage of *Quantum Break*," explains Antti Herva, lead character technical artist at Remedy Entertainment. "Given the quality bar that we set after the criticised facial animation in *Alan Wake*, we knew we had to up our game and we knew that it would be hard to afford the facial animation polish bandwidth usually needed for FACS-based approaches involving digital doubles in games."

Alan Wake was released in 2010 and Remedy Entertainment was already in the market for a new kind of mocap pipeline: this is a fast-moving industry after all, where time is money. To that end, capture solutions that can grab as much high-quality data as possible in a short amount of time are incredibly valuable.

> "We built a soft tissue eye rig and controls to sculpt and tune some of the key shapes on the fly"

"[Using DI4D's technology] means there is no need to generate FACS shapes, which cuts down modelling time," continues Antti Herva. "Time needs to be spent tracking the point caches, though. But facial capture data lessens the amount of facial animation and modelling needed in projects involving digital doubles, with some restrictions on accuracy."

Using this kind of workflow saves time, at the expense of some of the super-specific animation you'll see in hand-animated scenes. But the time that artists can save initially by scanning faces into DI4D's pipeline means that there's more time for animators to 'fine-tune' their actor's face in Maya later on, as Henri Blåfield (senior technical animator at Remedy) describes: "Being able to augment the facial data with both animator and runtime-systems-driven eye direction animation was very important, and for this we built a soft tissue eye rig and controls to sculpt and tune some of the key shapes on the fly."

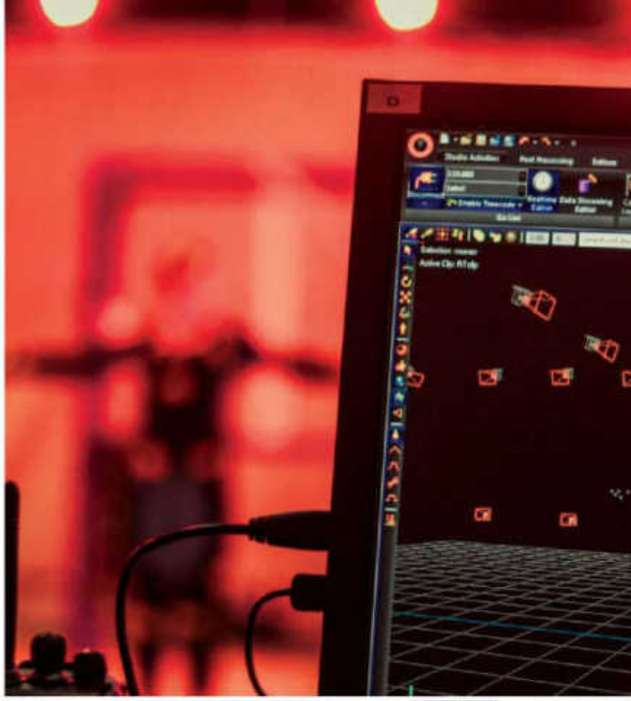
Both Remedy and Urquhart warned us that messing with the data once it had been captured could impact the realism of the actors' performance and you could risk undermining the work of the actor and the tech.

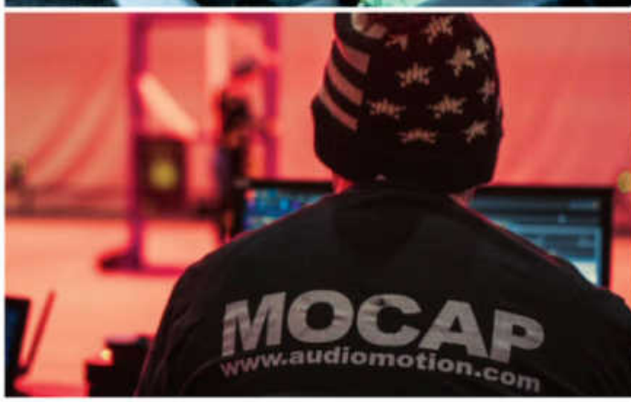
"The whole point of using DI4D is to capture as much as possible of the detail, subtlety and nuance of the actor's actual facial performance, and to do little or no facial animation in post-production," explains Urquhart. "If attempts are made to edit or adjust the performance in post-production it can be very easy to impact realism and believability, and risk falling into the uncanny valley."

"When treading the steep edges of the uncanny valley we found that often *very little* extra facial animation polish was warranted, suggesting that less was more," continues Blåfield. "Most of the work [in post] was iterating on the stabilisation of the point caches, the orientation of the character's head to ensure proper alignment and ensuring lip contacts in plosive phonemes."

But that's not to say that once the camera systems have done their work and the data is exported that the job is done – there's still need for an art team, and the animators still need to look closely at each frame of what they'll be shipping. It's useful to note, too, that the vast majority of mocap data is easily exported to the most common 3D software used in the industry.

"Artists usually use tools like ZBrush or Mudbox to retopologise and add detail to the static hi-res 3D mesh that is created using 3D scanning," explains Urquhart. "They may often use tools such as Photoshop if they want to add extra detail from high-resolution photographs of the subject."





A brief history of motion capture

Performance capture hasn't always been this comprehensive – in fact, when it started, the tech behind it was actually only two-dimensional...

1989

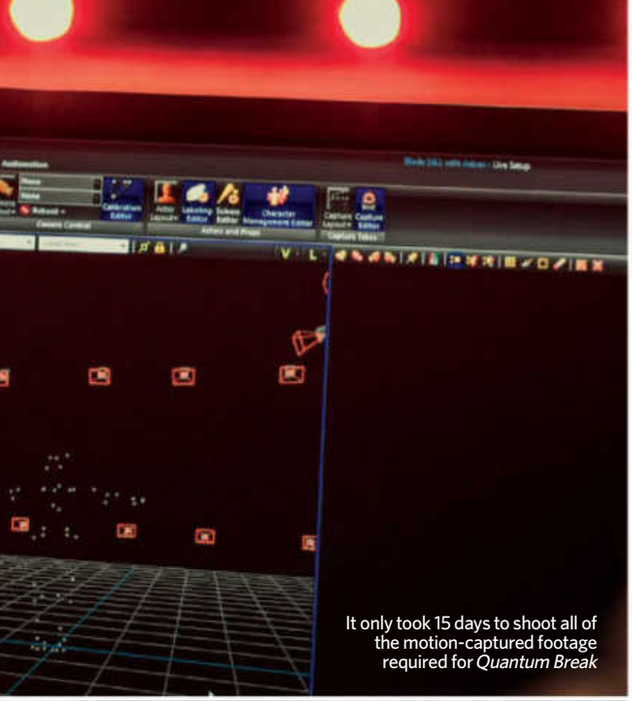
Using the animation technique of rotoscoping (developed by Max Fleishcer in 1915), *Prince Of Persia*'s unique art style was applied to videogames for the first time, inspiring other rotoscoped projects later – namely, *Another World* and *Flashback*

1992

Mortal Kombat was one of the first (in)famous games to use motion capture – the actors themselves even appearing in-game. The capture was only in 2D though; profiles of the actors were caught and applied to sprite-based movement strings

1996

A pioneer for motion capture, the origin game of the *Soul Calibur* series (*Soul Edge*) was the first to use a passive optical system for its motion capture – that means it's the first time you'd have seen those Lycra/ping-pong suits for use in games



It only took 15 days to shoot all of the motion-captured footage required for *Quantum Break*

Audiomotion's Brian Mitchell urges mocap users to rehearse and be capture-ready

GOING THROUGH THE AUDIOMOTIONS

UK-based performance-capture studio Audiomotion partnered with Remedy Entertainment to create large-scale in-game stunt sequences and player moves for Quantum Break

Audiomotion's technical director, James Witt, was kind enough to answer a few of our questions about the project:

You hear a lot about post-production when it comes to mocap, but Audiomotion offers pre-production services, too?
We work with clients to optimise their animation assets for use with a particular actor to ensure we get the best results. Though it is more likely that the characters are rigged and locked down before actors are cast...

When people think motion capture, they think live actors... but Audiomotion has animal rigging services available too – what are the main challenges in this sort of work?
The animals are live too! These are generally harder to retarget if they are quadrupeds, as they have four points of contact with the ground. This makes fitting a [motion capture] rig with different proportions to the captured subject more challenging.

Excessive fur or body mass makes the tracking of its underlying skeleton more difficult, too. This can be a problem with some people as well! [However] most of the problems arise when the subject doesn't take direction or doesn't particularly want to cooperate... Again, [it's the] same with some human actors!

What software do you use the most during capture, and is it compatible with the majority of 3D pipeline tech?
We use the Vicon suite of capture and editing software: Blade and sometimes Tracker. At some point the data will pass though Autodesk MotionBuilder and out as an FBX, which is supported by nearly everything 3D.

You work with marker and markerless tech: could you give us a summary of pros and cons regarding both?
We constantly monitor the development of markerless tech but we only really use optical markers for body and finger capture. We are not aware of any markerless motion capture system that offers the same scale and fidelity. Though markerless facial capture is possible, we would prefer to use cosmetic markers for this application as well as they are much easier/more reliable to track.

2001

Full-body 3D animation was beginning to become more commonplace at the turn of the millennium – especially in Japan. *The Onimusha* series was particularly notable on the PS2, whilst *Tom Clancy* started on a strong foot over on the Xbox

2006

By the end of the PS2 era, games had facial animation capture down to a good level – games like *Final Fantasy XII* pushed 64-bit consoles harder than ever, and produced incredibly believable characters. It was a taste of what was to come on the PS3 and 360

2010

Heavy Rain captured the wider world's imagination with the way it portrayed actors as digital doubles. Based on the Havok engine, the game mixed full body mocap with advanced skin shaders, and real-time tears and facial wrinkles

2016

Digital doubles start to become more commonplace: the *Halo* series, *Call Of Duty*, *Quantum Break*, *Detroit: Become Human* and other triple-A titles use actors' likenesses to bring some star power to their games and achieve more relatable performances

Shawn Ashmore's digital counterpart showcases stunning levels of fidelity, running in a real-time engine

> "Quantum Break was being shipped as an experimental project in the games industry – with part of it being live-action TV-inspired drama"

Bearing in mind that *Quantum Break* was being shipped as an experimental project in the videogames industry – with part of it being live-action TV-inspired drama and the other part a game played in a real-time engine – the team at Remedy Entertainment had to get creative with how it shaped its workflow and utilised the assets that DI4D provided.

"The scale of the project suggested very early on that tracking throughout was key to our success," Herva told us. "We experimented with having multiple levels of detail in our tracking meshes while upscaling the results, but found that using a standard tracking mesh density had the least overhead. Ultimately, we shipped just under five hours of facial data with four trackers working full time, hitting up to 30 minutes of data per week for in-game lines and 20 minutes for cinematics. We optimised the process with deformers that allowed us to track fewer points for the lips and eyes [for] content we knew would likely not be seen up close. Despite these optimisations, this approach guaranteed us an unprecedented motion quality tier throughout the game compared to a FACS-based approach where the rig blendshape complexity and solve fidelity are usually a lot more varied for various reasons."

> "The scale of [Quantum Break] suggested very early on that tracking throughout was key to our success"

So what does the future hold for DI4D and the wider motion capture industry as a whole? We return to Urquhart for the answer: "The industry is always looking to capture more and more detail," he explains. "The ability to capture very fine detail – for example fine wrinkles at the corners of the eyes – is fundamentally limited by the resolution of available cameras. This is a particular issue if the cameras also need to be small and light enough to be mounted on a helmet. We have only recently been able to mount 2K cameras on a helmet, but in future it will be 4K or even 8K cameras, and the level of the detail captured will increase correspondingly."

As for where the most focused improvements will need to be made, it's actually the eyes – it's quite hard for cameras to image the lipid layer and the transparency of the eyeball surfaces as clearly as they do with skin. "Long eyelashes can make it difficult to capture the eyelids precisely," Urquhart reveals. "Eyes themselves are shiny and have transparency, [which] makes them difficult to capture. It can be difficult to see into the mouth to capture the tongue and even if the tongue is visible it is very difficult to track because it tends to appear, disappear and change shape rapidly."

Motion capture has long been an important tool in creating powerful stories in television, film and games, and because of the relationship it requires between actor, animator and artist, it's defied the standard pipeline any film studio or game developer is used to. And it's still evolving, still changing. But now that we're seeing more A-list stars actively request motion capture work to round out their portfolios, we can be sure of one thing: it's only ever going to get more important.

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Zero's team took on the monumental task of swapping seasons for *Black Mass*

With a global talent pool, VFX Legion has the know-how to make triple-A visuals

MAKE IT AS A COMPOSITOR

Get a seamlessly integrated foot in the door with practical tips and advice from industry experts

The art of compositing is rooted in the pre-digital era, from the trick films of George Méliès in the 19th Century to the ground-breaking work of the father of stop-motion animation Ray Harryhausen, who matted his creatures using a combination of rear-screen projection and a front, hold-out matte.

Nowadays, the often invisible art of compositing can be seen, or rather not seen, in a vast array of big and small-screen productions. Larger studios have entire departments of compositors working at the final step of the pipeline in a VFX facility or acting as a standalone department working purely on compositing shots. Common production tasks such as wire, marker, reflection and object removal, green screen and blue screen compositing, shot stabilising, tracking, sky replacement and more are all part of the job.

To help aspiring compositors looking for their first break into the industry we interviewed leading experts to explain how to get started, what's expected from a junior artist, tips for progressing and responsibilities for once you get to the top of your game and working on those all-important complex shots.

> "Practical experience, an eye for detail and a lot of passion is what you'll need; experiment as much as you can"
>
> **Michelangelo Neri Orliani**

In *The Man From U.N.C.L.E.* HMS Hermes was built by Cinesite's CG team

Before diving into what working in the industry as a compositor entails, it's important to know both what a compositor does and what compositing is. "Compositors are the men and women of VFX that weave the assets together and bring the shots to life... the last line of defence in the VFX pipeline before a shot is completed and sent to the client," begins Kyle Spiker, lead compositor and creative director at VFX Legion. "To a compositor, plates, CG, matte paintings, paint and roto are pieces of a puzzle. There are thousands of ways to put it together, so the talent and artistry of a good compositor is in creating a cohesive image efficiently, on time, and at a quality level befitting of the project."

To explain what compositing is, we asked Janeen Elliott, senior compositor at Image Engine and VES award-winner for Outstanding Compositing in a Feature Motion Picture: "Compositing takes everything that has been rendered and combines it with either other rendered elements, for example from the lighting and FX departments, and/or with live-action elements. Live-action elements could be a background plate, a green screen plate or something as simple as a smoke element that was shot over black. We combine all of these elements, balance for colour, film grain and film aberrations, and in the case of my work, strive to make the shot look as photoreal as we can – typically trying to mimic how all of our elements would look had they been shot through a camera at the same time."

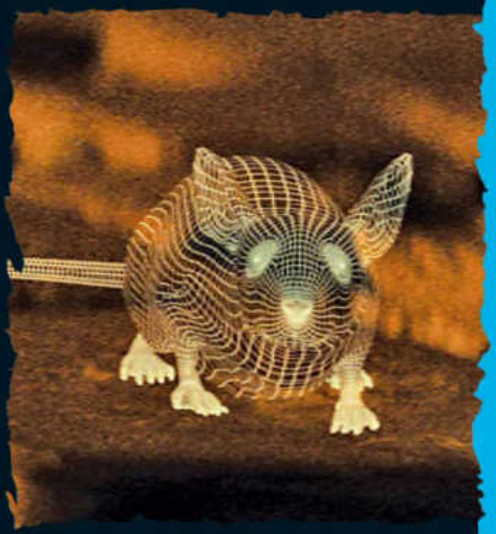
LANDING A JUNIOR COMPOSITING GIG

To increase your chances of being hired for your first position, it's a smart move to gain some experience before applying. Being able to demonstrate key skills in your showreel will dramatically increase your chances. "Practical experience, an eye for detail and a lot of passion is what you'll need; experiment as much as you can, copy and learn from anyone with more experience than you, and be passionate and curious. Secondly, if you are compiling your first showreel go for quality, not quantity. It's better to have two great shots than ten average ones – always put the best at the very beginning. Showreels are judged in the first 30 seconds," explains

PLAN COMPOSITES

Like a house, you don't want to build the roof before the walls. Collect your materials, make placeholders for things you don't have yet and make sure all the pieces fit together according to plan. That way you can avoid surprises. Build up from there, improving each piece as you go.

Jeremy Brown



There's a surprising amount of digital Cinesite trickery you may have missed in *Spectre*

Michelangelo Neri Orliani, senior digital compositor and 2D lead at Cinesite.

One of the more common entry-level jobs available is rotoscope artist. "It's not always the most enjoyable task, but there's no escape from roto work in compositing," says Robert Liscombe, compositor at Zero VFX. "It's a great foundation skill. Understanding how to quickly disassemble an image using roto splines is equally as important as knowing how to reassemble it as a composite."

LEARN YOUR SOFTWARE INSIDE AND OUT

"The more you know about your tools the better you can use them, the more creative your workflow will become," explains Spiker. "The more fluid your input, the better your ideas will flow. Ideally, the software becomes an extension of you... not a limit, but a magnification of your imagination. This won't happen without an encyclopedic knowledge of the program. A qualified candidate needs to be able to roto, track, key, colour correct and paint. VFX is a fast-paced industry and learning on the job comes with the territory, but without a working knowledge of the basics, you're going to be a liability. That said, the fundamentals are only going to get you so far... what I look for in a junior artist is strong communication skills and an eagerness to learn."

Elliott affirms: "Compositing is one of those right brain and left brain roles where (I believe) you need to have a certain technical understanding of how the software works but also, and perhaps more importantly, you have to have a good eye for detail and composition. Compositing is not for the lighthearted. The comments can seem harsh sometimes, and the hours can be crushing. As compositors, we are the last in line before the job leaves the facility, so if the deadlines have been pushed in other departments, often there isn't much room for deadlines to shift in compositing. So overtime work is very common, especially when starting out and you're struggling to learn pipelines and procedures as well as efficient techniques. Stay true to your ideals though, stay focused and you should weather that time well. Compositing skills that would be best to tackle for a junior role would be roto and paint, paint work cleanup, rig removal, character removal; tracking, including manual tracking using the tracking systems and camera tracking within the compositing software; basic keying of blue screens and green screens; some CG integration – even of a simple model; and some integration of live-action elements – smoke or dust or something similar to show the ability to utilise library elements."

"You work throughout the production process and need to deliver lots of shots to a tight deadline, so it's important to be able to debug and problem solve along the way," adds Orliani. "A meticulous and methodical approach and the ability to be an active part of a big team are key. Having the ability to balance the quality of your work and the time available to always get the best possible result is also vital in the role. In terms of software and tools, After Effects is a good starting point, but experience with NUKE or another node-based software is essential to work in the industry.

BLOCK SHOTS

Test before committing. To avoid wasting time and energy it's important to figure out your solution before you start to refine it by creating a simple proof of concept shot. Blocking your shot first will help you find any problems early and make your final path much less stressful.

Kyle Spiker

KEEP LEARNING

With experience as a junior under your belt, your next goal will be to work your way up. "Visual effects is a continuously evolving industry with more powerful tools available each year," explains Spiker. "I've found it extremely important to test and refine my process whenever I can. Never be afraid of a new technique, piece of software, ideas or tips. Learn to be okay with being wrong and accepting criticism."

Liscombe adds: "Always keep building upon your skill set. Examine the techniques that more senior compositors have used to complete a shot. The beauty of node-based compositing is that it is super easy to follow another artist's workflow. Mimic elements of their work and add those tricks to your toolkit."

Further study is also recommended by Elliott, who advises to "continually learn and follow updates to the technology and discipline. Learn from your peers – ask questions on how they approached a problem, attend software launches and watch online tutorials to stay on top of the technology. You can pursue growth artistically with your own side projects, but technically you are dependent upon learning from the people creating the software and how others are using it."

CLEAN SCRIPTS

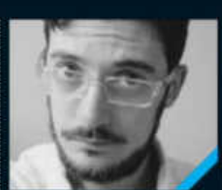
It's a good rule to try to keep your scripts tidy. Not only does it help you find your elements and hunt down any issues but you'll also encounter less confusion when you hand off to another artist, which can happen sometimes with last minute scheduling changes.

Janeen Elliott

JANEEN ELLIOTT
Image Engine
image-engine.com
Projects:
• Chappie
• Elysium

KYLE SPIKER
VFX Legion
vfxlegion.com
Projects:
• Avatar
• Justified

LUKE BICEVSKIS
The Sequence Group
bit.ly/1Tb3R5M
Project:
• Halo: The Fall Of Reach



MICHELANGELO NERI ORLIANI
Cinesite
cinesite.com
Project:
• Spectre

JEREMY BROWN
Zero VFX
zerovfx.com
Projects:
• Hardcore Henry
• Southpaw

ROBERT LISCOMBE
Zero VFX
zerovfx.com
Project:
• Black Mass

The house wasn't burned down in *Sinister 2*, as VFX Legion provided visual effects

In *San Andreas*, Cinesite added CG rotors to a hydraulic rig to sell the illusion it's flying

GETTING INTO THE INDUSTRY

Janeen Elliott reveals top advice for getting hired as a compositor

"While it is totally possible to get into the VFX world by self-training, recruiters usually want to know that there has been some formal training involved and that you've been taught to avoid some common mistakes. Train up in roto and paint work, keying and CG integration.

"Do some matte painting if that interests you, and comp that into your background. Try to integrate some live action elements such as smoke or dust. Compositing is all about layering elements, colour grading and overall balance as well as adding in fine details to sell the shot. In film, compositing gets literally down to the pixels in detail work. Hone that ability to work on the details of the overall shot so that it looks as seamless as possible.

"Ask a friend or peer to check your work, as it's amazing how often you can overlook obvious mistakes when you're focused on fine details. Stay true to the work that you would like to do and don't be afraid to express those interests, for example if you really enjoy doing CG integration work, don't be afraid to tell production that you'd prefer that type of work. Most often they will try to accommodate."

UNDERSTANDING SENIOR ROLES

Elliott has been a compositing sequence lead in the past, but has now settled on the role of senior artist. "The senior artist role... consists of compositing shots (often more complex shots), sometimes being called in to do specific look development, gizmo and tool creation, assisting fellow artists, getting shots done quickly, efficiently and looking great without the need of much direction from 'sups'."

A camera shot for *Elysium* flying up and over into the space ring proved a memorable challenge. "At first the camera is facing Earth and the ring (which orbits Earth) was dark, then when the camera flew up over and into the space ring, we were facing away from Earth glancing past the bright Sun into the bright terrain of the ring. It was an extremely complex shot with multiple layers, many of which did not render with motion blur so that needed to be applied in comp. Not to mention layers of elements, added lens flares and other extras, and it was basically two different shots in one, due to the lighting and perspective change. Ironically, I do enjoy the complex shots most! I enjoy being given a giant task of a shot and making sense of it, down to making it really beautiful."

As a lead compositor it's Spiker's responsibility to review what's been shot, understand the client's needs, discuss the most effective solution with his

COMPOSITING WITH AFTER EFFECTS

Luke Bicevskis explains why the Adobe program is Sequence's go-to tool

"Growing from a motion comics/graphics background, Sequence has always enjoyed the use of After Effects and other Adobe products.

"For *Halo: The Fall Of Reach* we used AE exclusively for compositing. It allowed us to integrate multipass EXR renders, 3D cameras and 2D multilayered digital matte paintings. We were then able to relight our scenes and generate all of our FX in the program. Being able to create a complex nuclear space explosion or rig a 2D puppeted character for added background movement within the program gave a lot of creative power to our artists, and freed up our pipeline from a great deal of unnecessary task management.

"Being a smaller, boutique studio we rely on talented, multi-skilled staff to bring projects to life. AE is perfect for a generalist, with content creation in-app being more robust than other compositing software. Whether we are working on live action VFX, a 2D-cell style animation or design-based title sequences, we know the tools can add content on the go."

Zero VFX stepped into the ring to deliver invisible visual effects expertise

team and convey that message to the compositors involved. "For me, my most challenging task has always been paint, specifically frame-by-frame paint. It's taken me a lot of practice to find a method that doesn't wobble from frame to frame. I've improved greatly over the years but smooth gradients with subtle light changes still pose a challenge. It might sound weird, but pulling a perfect matte is one of the most enjoyable things I do as a compositor. Just like pulling protective plastic off of new electronics, for me, there's nothing as satisfying as finding the perfect keying solution with the least amount of moves.

"It's this enjoyment that led me to develop a custom keying tool. Combining my years of experience with the help of another Legion artist, Nick Guth, we created a keyer setup [to] handle any screen colour (even grey). Our keyer gives an artist the ability to pull keys better and faster than any previous method we've seen. It's a 'one-click' key that gets results immediately and offers every control necessary to combine your edge seamlessly into the background. Given enough time to dial it in, there can be zero loss of foreground detail. I really like keying, and my standards for quality tend to be the highest here."

Orliani's responsibilities as a senior compositor and 2D lead can differ depending on the show, he says: "As a compositor I have to deal with a wide variety of scenarios: rotoscoping, painting and removing elements from a scene, 2D and 3D tracking, a huge amount of blue screens, compositing of CG renders, sky replacements, colour matching between shots and much more... A lot of time is spent creating a variety of templates in NUKE that all the compositors need to use in order to ensure continuity through the shots. How the CG passes are combined, grain, colour presets and custom tools designed for the show are all set up in advance, often before we hire the compositing team. Another very important part of my job is to keep a continuous channel of communication going with the 3D department to discuss how we are going to tackle all the aspects of the CG renders and how they will be used in the 2D world to make the workflow as efficient as possible."

"My primary role is, first and foremost, to create visually stunning images," says Jeremy Brown, lead compositor at Zero VFX. "I work closely with our VFX and compositing supervisors to develop and implement the creative vision of the studios and directors. I am in part responsible for maintaining pipeline and workflow tools. Usually, the most challenging tasks are not technical, but creative. Since creative direction informs how we go about achieving things technically, it can make it difficult if creative goalposts shift in the middle of the process.

Liscombe's most challenging tasks have come from having to retime the speed of long, sweeping dolly shots, he reveals: "The problem with dramatically increasing the speed of a moving camera means that moving objects within the scene can appear to be travelling at unrealistic speeds. After preserving the original timing of the moving elements in the scene, I've had to rebuild the world around them to cover up all the holes that the moving elements left behind. I've reconstructed an entire street in downtown Hong Kong in order to keep taxi cabs from breaking the speed limit, and I've reassembled a corral full of running horses while the camera was travelling backwards at nearly 30 miles per hour.

"I enjoy solving problems like this, you find yourself chasing issues until every hole is filled, and when you get to the end you realise that almost every element in the shot was placed there by you, and when done right the viewer would be completely unaware that any work went into it."

STABILISATION

When motion tracking (applying tracking data for one object's movement to another object) an image in 2D it's helpful to view the stabilised results of the tracking data. This is because any bumps or deviations in the track will then become much more apparent when played back through a stabilisation.

Robert Liscombe

"The fastest and easiest way to texture"
- Simon Fox, Blizzard

"Holy shit this is bad ass"
- David Lesperance, Valve

"An essential part of my pipeline"
- Josh Marlow, Epic

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Photorealism without global illumination

Improve your lighting skills using Cinema 4D R17

Try to imagine yourself waking up one morning with all your favourite GI render engines gone. No QMC, no light maps, no path tracing, no unbiased sleeky wizardry helping you with indirect lighting – just you, left alone with nothing but your very own lighting skills. What would your lighting skills look like?

In the Cinema 4D community's discussion of final gallery images, lighting is often nothing but a purely technical aspect – a process covered by render-engine specifications and expressed by nothing else but terms like ray depth, bounces and sample counts.

And when there are before and after comparisons of lighting with and without global illumination, the imbalance is even more obvious – most artists have simply forgotten how to light without GI. Most artists are simply dependent on GI: they'll head for a deadline not knowing how to do a realistic and animation-proof lighting setup, which come without the computing demands of GI or the danger of flickering artefacts.

In this tutorial you will learn how to do an elegant and robust lighting setup easily capable of camera and object animation. Along the way some of the latest features of Cinema 4D R17 will help us do the job. When you show the final result to a colleague or a client it's a pretty safe bet they won't notice the difference between this and a GI render. And remember: it doesn't have to be physically correct, it just has to look physically correct.

MARC POTOCNIK
Oberbilk, 2016

Software
Cinema 4D

Learn how to
- Implement real-world insights in a C4D scene
- Build a highly realistic, elegant and animation-proof lighting setup without GI
- Complement your lighting setup with smart custom-built shader setups
- Refine and streamline your rendering process

Concept
An everyday living room in early spring. It's worn, used and flooded with light. This is photorealism without global illumination.

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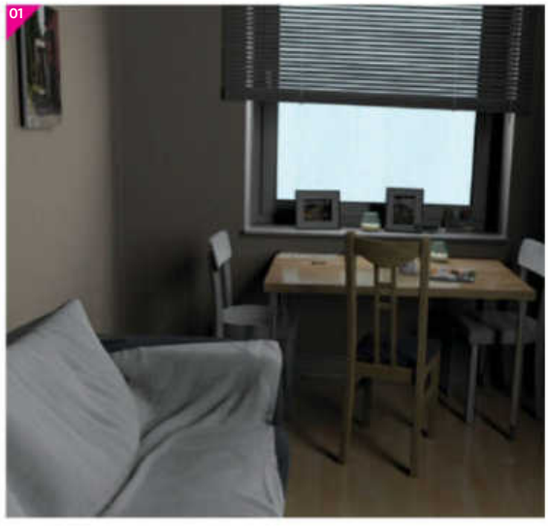
- Texture maps
- Tutorial screenshots

01 Set up the diffuse daylight First of all we will implement a diffuse daylight. Windows function as 'gates' for diffuse daylight coming from the sky. To reproduce this we will use area lights placed in the windows. There is a two-part window ahead and one aside (represented by a dummy). Create an area light with area shadows in the size of your window's lower panel. Place it slightly in front of it. Set the falloff to Inverse Square with 600cm range. This creates a bright beginning and a rapid decrease of your light so you just need 25 per cent brightness. Note: for every area light in this tutorial we will restrict the light emission to z-direction only and deactivate the Specular checkbox as we will place specular-only lights later. Repeat these steps for the upper parts of the window ahead and the lower part of the window dummy. For the latter, use only 12.5 per cent brightness.

02 Add daylight colour nuances with the new Color Chooser Natural daylight is far from being pure white. As it bounces off every part of your surrounding, it transports the colour of participating objects. As we already know, windows function as a gate for light and this is the same principle as camera obscura: light from the surroundings passes through a gate and is reproduced upside-down on the inside of the camera. For a very diffuse version of such an effect, create a material with a gradient in the Transparency channel. This gradient should contain beige and blue, which represent the buildings and the sky. For finding the right colours, Cinema 4D R17's new Color Chooser will help as it provides Color Harmony palettes such as Complementary and so on. Apply the material to your daylight light sources and make sure the blue part is the lower part to be seen on the wall. Voila – you just made your daylight more vivid and interesting.

03 Set up the direct sunlight For the direct sunlight, create a light source outside the room, choose the Infinite type and choose Area as the type of shadows. The sunlight should have 100 per cent brightness and a slightly yellow colour with about 10 per cent saturation. Leave the Specular checkbox activated as we want the directional sunlight to cast speculars. For orienting the Sun, apply a Target Tag to the light source from Object Manager>Tag. Then create a Null Object, name it 'Target Sun', place it on the wall to the left to the window ahead and drag it into the Object field of the Target Tag. Position the Sun with an angle of about 40 degrees.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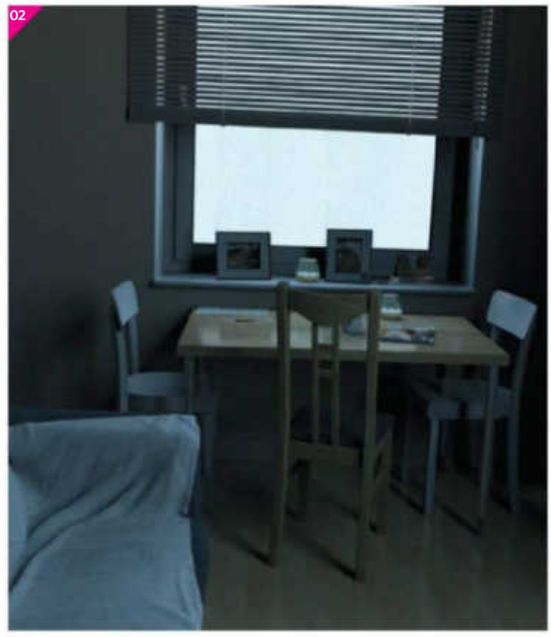
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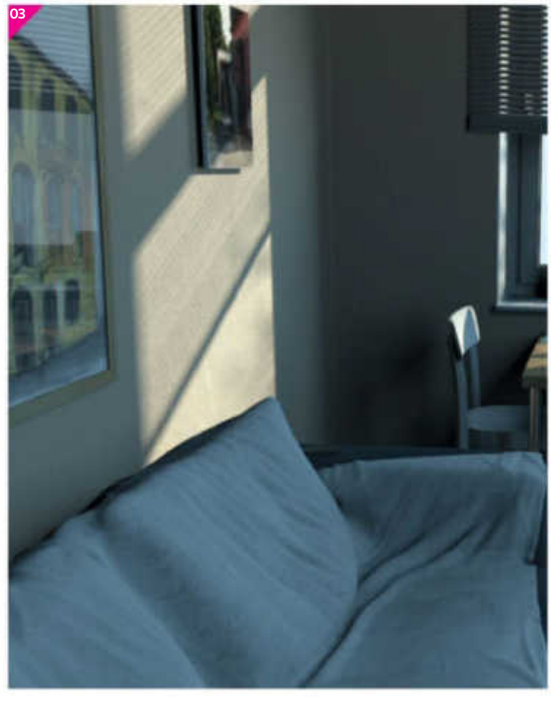
Cinema 4D R17's Color Chooser
The new Color Chooser in Cinema 4D R17 provides great capabilities for the systematic generation and modification of colours. You can use different modes to define colours (Color Wheel, Spectrum and Color from Picture) and use them with different Color Models. For the creation of complementary colours, eg for the light nuances of the daylight, double-click on one knot of the aforementioned Gradient. Use the Color Wheel to pick your first colour. Instantly a Color Swatch is created below the Color Wheel. Now choose Complementary from the Color Harmony symbols, click on the Color Picker and you'll be able to create another swatch.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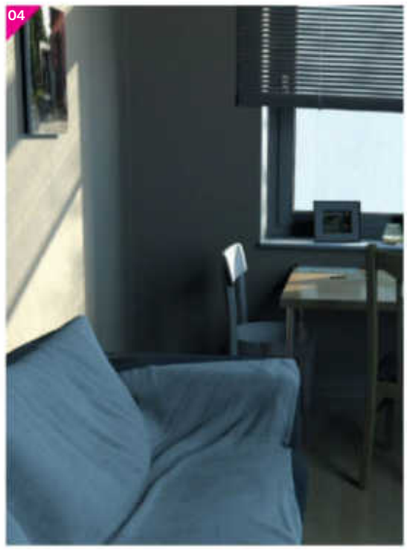
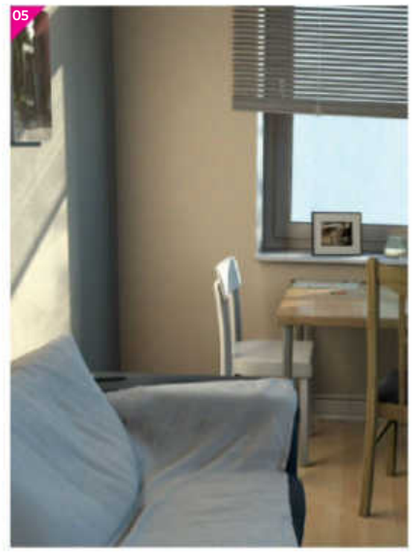
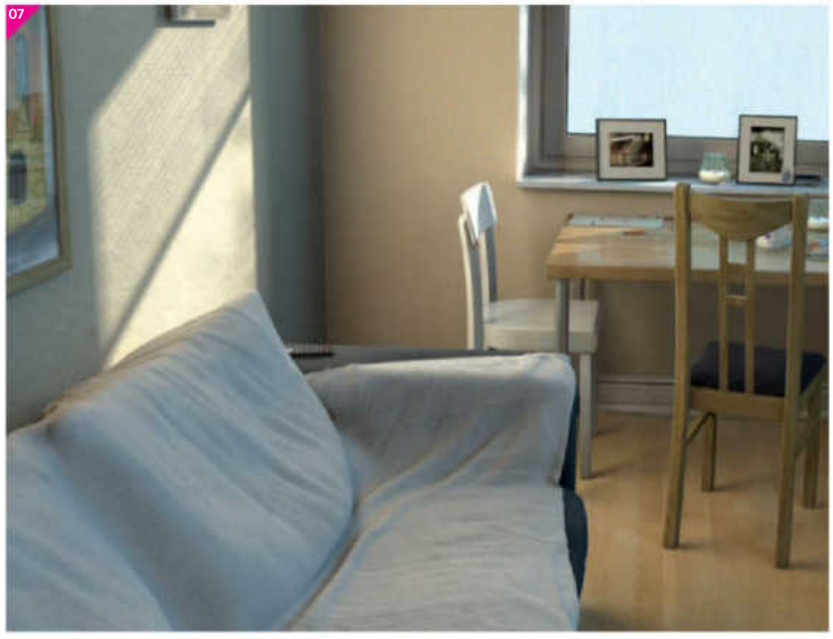






> The quality of your indirect light can cause your lighting setup to stand or fall since it is an indicator of credibility

04 Add directional daylight The light of the Sun and the sky aren't isolated phenomenons: as the atmosphere is a medium for dust and fog there is always an area around the Sun almost as bright as the Sun itself, but with a more diffuse light emission. For this purpose we copy our sunlight, reduce the brightness to 70 per cent and the colour saturation to 5 per cent. In the Shadows Tab alter the field Infinite Angle from the default value of 0.5 per cent to 7 per cent. This gives diffuse behaviour to the area shadows. Name the light source 'Skylight directional'. The result is a desaturated diffuse flare around the direct sunlight on the room's wall.

05 Set up major bounce lights Direct light always causes indirect light to bounce off surfaces and carry information about its brightness and colour. The quality of your indirect light can cause your lighting setup to stand or fall since it is an indicator of credibility – and an essential part of the art of lighting. As we want our lighting setup to be lightweight, we will just place two major bounce lights. For indirect sunlight, create an area light with 20 per cent brightness and area shadows in the scale and position of the wall's directly lit area. Use the wall's colour set at 15 to 20 per cent saturation. Apply an Inverse Square falloff of 1,000cm. For indirect room light bouncing off the walls, create a similar light with 75 per cent brightness at 200 x 250cm. Use a smooth linear falloff with a large range of 800cm. Place it slightly above and behind your camera and rotate it to 45 degrees down.

06 Work on minor bounce lights Create a copy of the first bounce Sun and name it 'second bounce Sun'. Place it slightly in front of the opposite wall. Use only half of the brightness, the saturation and the falloff distance of the original. You may want to place a small copy of a second bounce Sun with only six per cent brightness and 300cm falloff distance on the window's corner area, which will be directly lit by the Sun. This little guy points straight up and adds local indirect light to the wall around the window. Name it 'bounce Sun Windowboard'. We have now created four light sources simulating indirect light for the whole room.

07 Create effect lights In the final scene there are four simple point lights with or without shadow maps, they only emit specular illumination. Speculars are a very simplified and fast representation of full-grown raytraced reflections. While this is far from being physically correct it easily helps us to create beautiful rims on objects, a substitute for anisotropic reflections on the Venetian blinds or a specular representation of the Sun's indirect light (we'll explain what anisotropic means in the next step). A specular-only bounce Sun takes over the specular part of the first bounce Sun and is easier to control than its original. Other effect lights can enhance the lighting setup such as the rim couch light, which comes from the wall and is restricted to the couch. To sum up: our lighting setup contains five main lights, two main bounce lights and eight nice-to-have lights. Apart from the four bounce lights there is nothing different to a GI lighting setup.

08 Use reflectance to add realism Reflectance covers all aspects of mirror-like or specular reflection with dedicated reflectivity models. Reflections depend on the viewing angle, which helps make objects locatable in your 3D scene. Also the reflectivity of an object lets you draw conclusions about the nature of its surface. Let's study an example – the tabletop. The diffuse reflection on the tabletop implicates that it is rugged with the surface worn down over the years. The reflectivity model is anisotropic, which means that the rough reflection is stretched in one direction as if caused by microscratches. The amount of roughness of the reflection is varied by a Layer Shader (click on the black triangle left to Roughness). The amount of reflection itself varies, as if some areas are randomly more worn down than others. This is done within the Mask tab in the Reflection Layer: it hosts a Layer Shader with several Noises, a Fresnel Shader and Bitmap textures stacked over another.

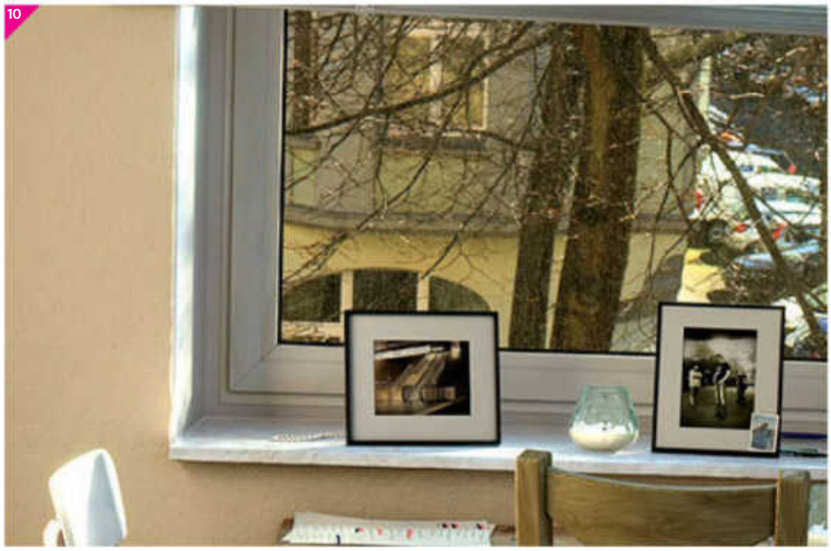
09 Add realism through modulation As we already know, modulation is an essential part of our scene's credibility. But there is more to variation than just reflections. When you have a closer look at the room's wall you will see that there are lots of subtle random irregularities. These are created by the Bump channel, which contains a Layer Shader with some Noise Shaders stacked over a photographed Bitmap texture of a real wall. For variations keep Noise Shaders in mind: they are nothing other than mathematical random functions being visualised and are perfect for random structures such as dirt, abrasion or subtle colour shifts.

10 Break up transparencies Transparencies get more interesting and credible when they are broken up and made visible. In a very basic way this is done by refraction or reflectivity. In a more sophisticated way you can add Shaders or Bitmap textures to the Transparency channel. Let's see two examples in our scene. For the CD cabinet, the glass of the door has an index of refraction (IOR) slightly above one, which is physically incorrect but just looks correct. Also there is a Fresnel Shader with just seven per cent Mix Strength in the Transparency channel; the sharper the viewing angle gets, the stronger the reflection is. Because of this the native field Fresnel Reflection is set at 0 per cent. In the Reflectance channel the General Reflection Brightness is boosted to 300 per cent, so the reflection is visible, even in more transparent areas, which gives the glass a nice sharp look. For the window ahead the glass panel has an additional material tag with a texture based on photographed window dirt.

11 Brighten up your shadows Subtle indirect light is not very locatable and mostly appears in shadowed areas, brightening them up. So why not implement this as a material-based self-illumination appearing only in shadow areas? Let's check the material 'plastic remote red'. The Luminance channel contains a Layer Shader named Shadow Luminance. Inside this you will find a Color Shader Layer with low opacity in the main colour of the room's indirect light. This layer is masked by a Colorizer Shader below in the Layer mode Layer Mask. Inside the Colorizer is a Lumas Shader with only the diffuse component active. With this, the Lumas Shader acts like the Color channel saying 'Show me where I am in the light'. This behaviour is inverted by the Colorizer gradient: from white to black. If you use this Colorizer for masking the Color Layer the result is a self-illumination on the shadow-side of the object.

08

09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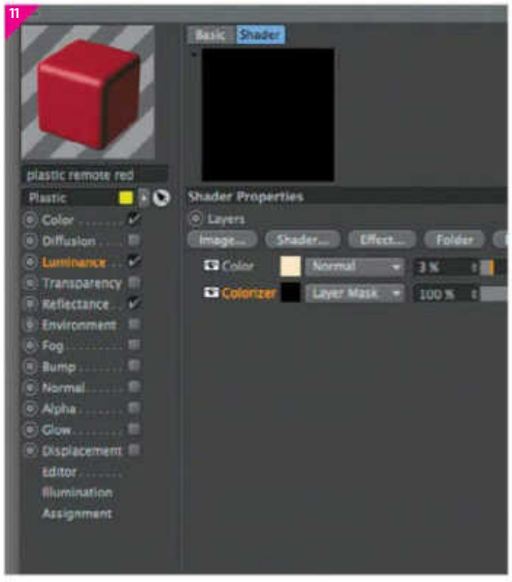


11

Variation Shader

When it comes to modulation, there is a new Shader called Variation. It is ideal for varying material properties of lots of objects that are randomly based on user-defined specifications. Variations of a material are possible with a defineable probability that are either object-based or polygon-based. These will take place via a secondary texture, a colour gradient, random colours, gradation or UV variations.

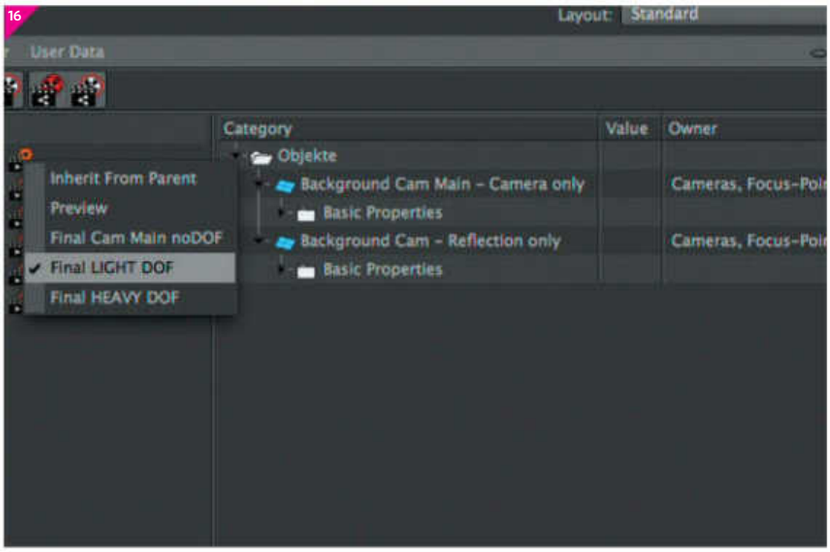
12 Use Smart AO With Shadow Luminance, shadows become brighter but also a bit too flat. Let's counter this. Diffuse contact shadows mostly appear in already shadowed areas. The Ambient Occlusion shader (AO) simulates such shadows but also in directly lit areas, which doesn't look credible. For masking AO to shadows we will use a similar Shader setup as before. Copy Shadow Luminance to Diffusion and rename it 'Smart AO'. Activate the channel's Affect Luminance. Inside Smart AO replace the masked Color Layer with an AO Shader. Put a new Color Shader (white) below the Colorizer. Save Shadow Luminance and Smart AO as Presets by right-clicking the triangle next to Texture in the appropriate Material channel. Tune the look of your scene to be a bit flat by choosing '16bit' for Depth in Render Settings. This provides space for a dynamic level correction in post-production.

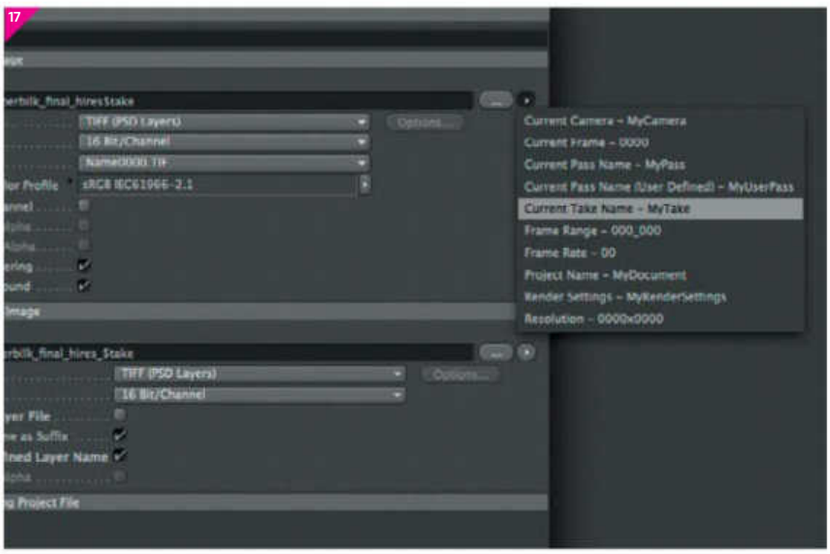
13 Review shadows, reflections and SSS Your scene now looks good but render times should be improved. Think about where to replace beautiful but slow and rough reflections with simple but fast speculars, eg for the beaded chain on the window. Objects that are very close to a light source casting area shadows can create extremely diffuse shadows, which slows down rendering. To avoid this go to the light's Project tab and exclude these objects from shadowcasting. Try to avoid highly transparent objects from casting area shadows by unchecking the Cast Shadows option in the Compositing Tag of all glass panels. For the direct SSS, the candle wax has subsurface scattering (SSS) applied. Caching SSS is great, but building up the cache can take up some time too. Sometimes it is faster to just use the Direct Mode in Shader>Multiple.

14 Use the Physical Render Select the built-in Physical Render engine (PR) from Render Settings>Renderer. The PR is perfect for scenes with lots of samples to be calculated such as area shadows, rough reflections and so on. In scenes solely containing sample-based calculations, the PR is even faster than the Standard Render – try this with scenes only containing geometry and ambient occlusion. Besides that, the most important feature is the PR's simulation of real camera characteristics such as F-Stop, depth of field (DOF), Lens Distortion (for wide-angle shots), chromatic abberation (for a more analogue look) and so on. The cameras of our scene have different focal lengths and Lens Distortions. Use a Null Object for defining the focus point and drag it into the field Focus Object in Camera>Object. Lower F-Stop values result in more DOF, which in return takes longer to render.

15 Tune render settings The following steps can speed up rendering by up to 300 per cent. Reduce Reflection Depth in Options to 2 to cut further reflections of reflections, which are often dispensable anyway. Threshold cuts off every transparency or reflection weaker than the value defined; try values between two to five per cent. For the PR settings, tune the AA parameters Shading Subdivisions to avoid moiré. Keep Shading Error Threshold as high as possible and as low as necessary to avoid grain. If necessary, increase Shadow Subdivision to three or four. For depth of field, bokeh can slow rendering. Consider switching off depth of field, rendering a Depth pass and doing DOF in post-production. Another thing to tweak is Different Render Settings in the bottom left, activate it by clicking the white square on the left. Different Render Settings can further economise your rendering.

16 Take advantage of Cinema4D R17's Take System The Take System lets you create variations (Takes) of your scene in one Cinema 4D file. We will use this for specifying sets of Cameras, Render Settings and background image planes. Go to the Take Manager (the vertical tab right to the Object Manager). The basic status of a scene is given as Main by default. For altering parameters across different Takes you can also use the Main Take. Create new Takes with the button New Take and name them accordingly. Click on the small white square to activate a Take. While in the Take activate the appropriate Camera and Render Setting. Inside a Take, all parameters of an object's Attribute Manager are greyed out. So for activating the proper image plane you must create an Override. Return to Main and right-click on Enabled in the plane's Attribute Manager (Basic tab), choose Override and activate the plane. Repeat these steps accordingly for other Takes.





17 Variable names with the Token System For naming your render output let's try another new feature of Cinema 4D R17: the Token System. This System enables you to assign variable name suffixes to your render output, eg the name of the Take. Go to the output entry of your Render Settings, click on the triangle button to the right of the file names field and then choose Current Take – My Take. This adds the variable $take. In the case of the Take Cam_Main the render output is named filename_Cam_Main.tif. Takes can be marked with the small dot on the right of the Take's name. Then simply choose what to render with the appropriate command from Take Manager>Render. Happy rendering! After completing this tutorial and re-creating the scene you will have learned a good lesson on how to light. Setting up lighting without global illumination greatly improves your skills and helps you to meet your deadline, especially when it comes to animation.

Showcase

Marc Potocnik

Marc is a German designer and founder of animation studio renderbaron, producing 3D animations for Audi, ZDF, BMW and so on. Since 2001, Marc has been an authority on shading, lighting and rendering, sharing his knowledge as a Maxon certified instructor and as a speaker at events such as SIGGRAPH.

ZDF – Leschs Kosmos
Cinema 4D R16 (2015)
These 3D animations were created for ZDF's TV documentary *Leschs Kosmos* episode 'The Nightmare of Flying', about the hidden dangers of aviation.

Audi – CES 2014
Cinema 4D R15 (2013)
Styleframes for Audi's g-tron appearance at CES 2014, Las Vegas. As with all works of renderbaron, the lighting has been achieved without GI.

Unter freiem Himmel – Subway
Cinema 4D R11.5 (2010)
Scene from the first teaser for *Unter freiem Himmel*, a non-commercial movie by Marc Potocnik. This was done in Cinema 4D R11.5 – without GI and R12's Linear Workflow.

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

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Kitbash quick and simple concepts

Learn how to build a triceratops using parts from a kitbash library, frame your composition and texture pieces

MARK VAN HAITSMA
Triceratops, 2016

Software

3ds Max, ZBrush, KeyShot, Photoshop

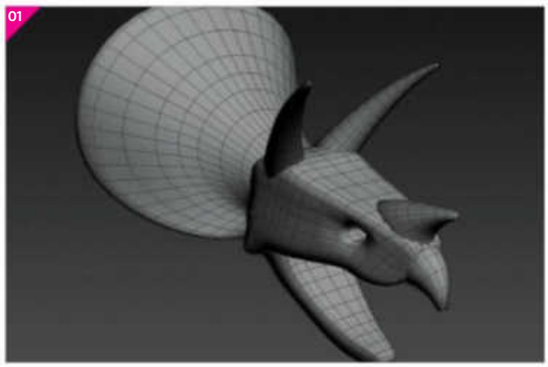
Learn how to

- Create 3D illustrations fast utilising a 3D kitbash library
- Render to get quick results out of KeyShot
- Add quality to the render with Photoshop

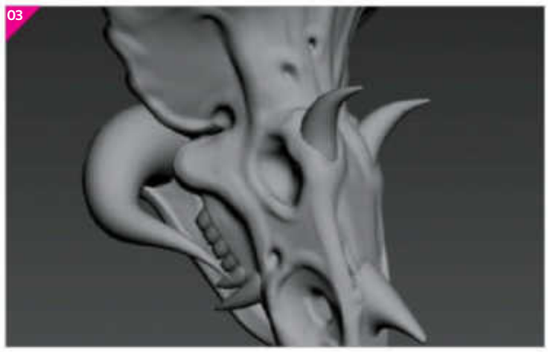
Concept

I generally don't make concepts for my personal work, I just dive in, start making shapes in 3D and see where it takes me.

You can create a quick portfolio piece utilising a 3D kitbash library and this tutorial will show you the core techniques to do so. You will learn the importance of just keeping things simple and not overthinking the creation process. We will cover block-out modelling using 3ds Max and ZBrush, as well as quick render set-up tips for KeyShot and a Photoshop layer guide to take your renders to a finished state.



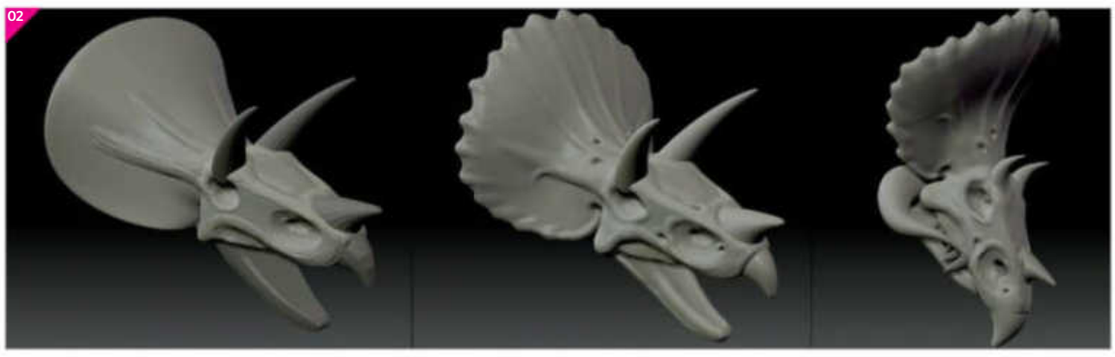
01 Block out a skull Find a nice side profile of a triceratops skull and quickly mock up crude shapes from that profile. Keeping it to ultra-simple block meshes, getting everything exact at this point is not important – in fact, even at the end it's not important if it looks exactly like a triceratops or not. Once the crude shapes are in place, send it over to ZBrush.



02 Sculpt blockouts Once in ZBrush take the basic forms that were blocked out and DynaMesh them together at a low resolution. Using the ClayBuildup and the Move brushes, lay out more detailed shapes. There is no need to over-complicate things, just draw in some cool shapes and get some ideas flowing; if it deviates from an actual triceratops, that's okay. Don't worry about every detail and just go with the flow. If nice shapes present themselves, then so be it.

03 Work on initial framing Once a more detailed skull mesh is sculpted, start to think more about the composition, keeping it at a fairly low resolution. Mess with the scale, rotation and placement of the ZBrush meshes and also set up a camera angle you are happy with.

04 Arrange kitbash pieces Take pieces from the kitbash libraries and see what works and what doesn't; it's rewarding to arrange pieces and get instant results. Continue to modify the composition now; as you're adding to the scene it is important to adapt the camera angle and framing. Only arrange pieces to fit one angle, don't worry about getting everything connected perfectly at other angles.



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- Tutorial screenshots
- Photoshop layers
- 3ds Max scene files

> “Take pieces from the kitbash libraries and see what works and what doesn’t; it’s rewarding to arrange pieces and get instant results”

05 Integrate the pieces into the skull Get to the point where you are 90 per cent happy with all the parts and how they are laid out, and then take the skull a bit further and integrate some of the tubes and canister connection points. Keep things very loose still. Since these skulls are going to have a very plaster-type feel, any super-fine detail you sculpt in at this stage is going to be overpowered by the porous final result. Use the hPolish brush to refine some of the ridges and on top of that run Clay Polish to smooth out the major shapes. At this point you should now DynaMesh it again at a much higher resolution.

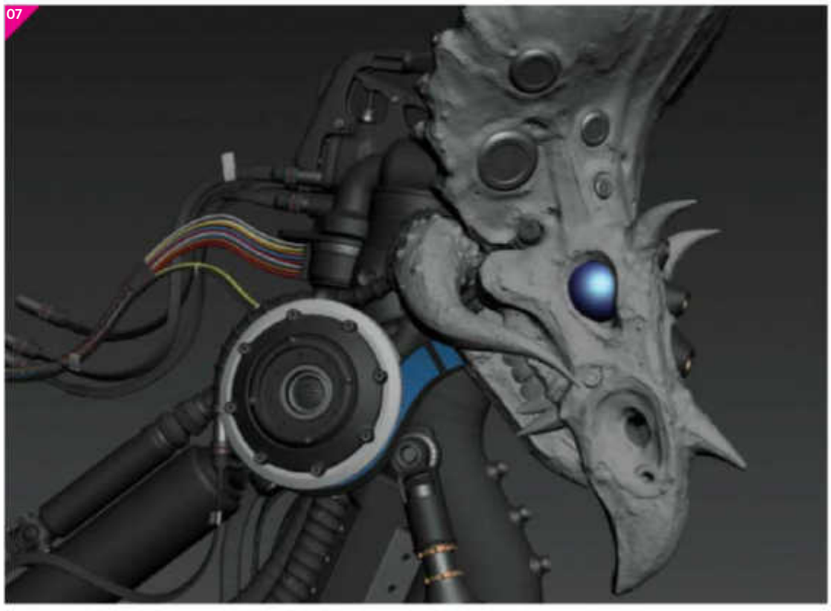
06 Texture the skull Once everything is integrated into the skull and you have the broad details you want, add the surface details. It's a good idea to use layers, in case you are not quite happy with some of the final details and want to edit them later. First add a broad noise pattern with a pretty large scale, which gives us a nice surface to work with for the Flakes brush. Using this brush along the grooves of the noise adds a nice layered plaster look. Also use a Standard brush with a Drag Rectangle and a circle Alpha to get some pits in there and some bumps on the horns. Keep it simple, you only need a few brushes to create a cool look.

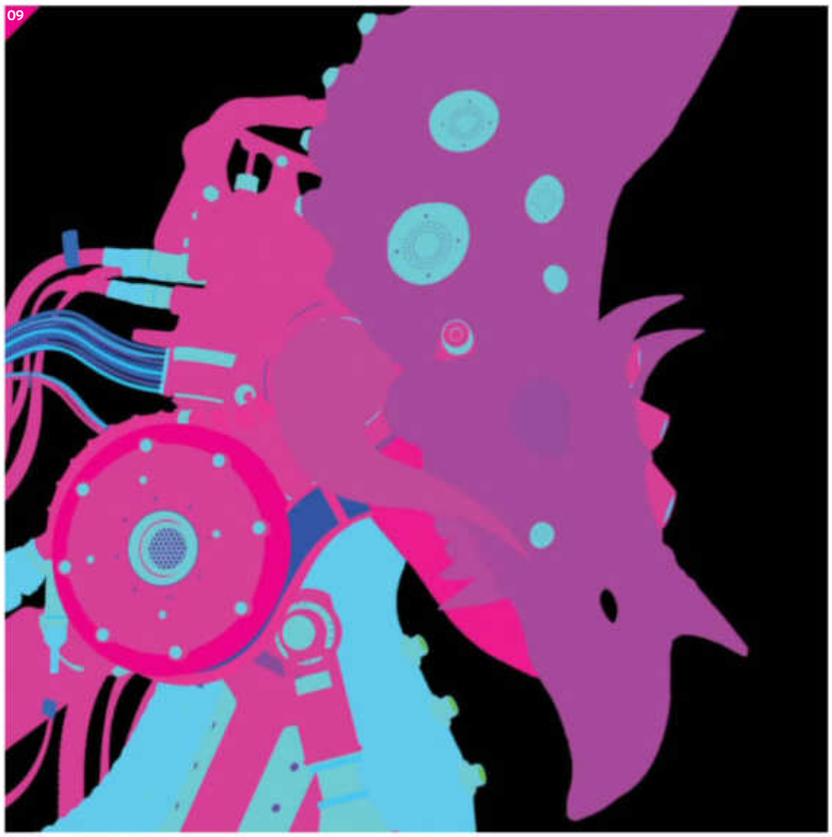
07 Final arrangement tweaks Now that the skull is pretty much done, make final arrangement tweaks with the kitbash pieces. Decimate the skull mesh and then send everything over to KeyShot.

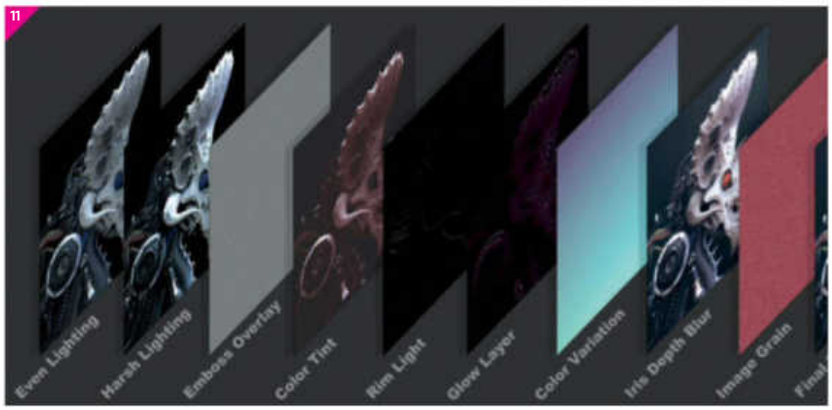
08 Work on KeyShot materials Again, keep things simple and just drag and drop materials that can be found in the default material picker. Everything will be amped up in Photoshop, so the exact material look is not super important, just get something that is close.

Kitbash libraries

Making use of great kitbash libraries speeds up the creation process and quality results can be made incredibly fast. Libraries used in this tutorial example can be found here: **gumroad.com/mvhaitsma**.







Don't be afraid of large changes

If something is just not looking right, don't be afraid to make some drastic changes to get things where you want them. The creation process doesn't always go smoothly. Allow yourself to be totally cool with scrapping large sections and reworking them. The most important thing is to get to an end result that you are happy with and that was fun to work on along the way.

09 KeyShot for rendering The main goal here is just to get a nice render or two. It's not important to spend all day tweaking render settings, we are just looking for quick results that we can push further in Photoshop. Utilising default environment maps, in this case the warehouse images, render out an image with nice, even lighting and another with some harsh highlights and shadows. Hold down Cmd/Ctrl and drag-click to rotate the environment to get specific lighting results. In the render settings, crank up the samples a bit and also the shadow quality. In the Passes section, turn on Depth Pass and Clown Pass as these are the masks that we will be using in Photoshop. Since the aspect ratio is going to be portrait style, make sure you give yourself some room horizontally in the renders to make some final cropping decisions.

10 Final image framing Make final adjustments on how you want the image to be cropped. Make sure to include the mask files you made along with the renders so that they can be cropped. It may be a good idea to check the box that says to not delete the cropped sections, just in case you change your mind later.

11 Work on Photoshop layers Start with the base render and add a harsh lighting render at a lower opacity, in this case at 50 per cent to add some contrast. Add some overall image colour tints with various layer styles. Then use the clown mask to pick sections one at a time and tint colours independently. Overlay an emboss of the original image to bump up the edges and add sharpness – sometimes you can copy this layer a couple of times to amp things up even more, especially on the skull.

12 Add a rim light with an emboss layer To show the silhouette of the character better, add a slight rim light using a bevel and emboss layer style, only utilising the highlight and turning off the shadow. The layer is usually just a black colour set to Lighten so that only the bevel and emboss highlights show up. Use the black-and-white image that was rendered out as the layer mask. Add an overlay of a colour gradient image to break up the render and add some variation. Sometimes adding a few different ones at low opacity can really make the image pop, even if it's subtle.

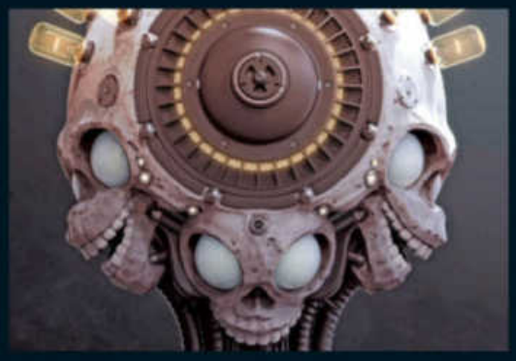
Showcase

Mark Van Haitsma

Mark is a senior artist in the games industry with over 12 years of experience. He feels fortunate to be working with some of the most talented people in the industry.

Receiver
3ds Max, ZBrush, Photoshop, KeyShot (2016)
This was a random thought on a Sunday afternoon. After it was done, it reminded Mark of a hub of some kind, almost as if it was receiving signals.

The Warden
3ds Max, ZBrush, Photoshop, KeyShot (2016)
This one was really fun to work on and is one of Mark's favourite personal pieces. Whilst he is not a fan of spiders in real life, he finds that they are interesting to look at.



Monkey Brains
3ds Max, ZBrush, Photoshop, KeyShot (2016)
As he is a huge fan of monkeys in general, Mark decided to integrate some monkey features into his continuing skull-themed renders.

13 **Adjust tints and opacity for glow** Take the highlights of the image, add a decent sized Gaussian Blur to them and set the layer to Screen to get a nice light bloom off your surfaces. Tint the colour as well and keep it to 40 per cent Opacity so that it's not overbearing. Add a Levels Adjustment layer towards the top to do some final adjustments to contrast. With all of these layers being added, sometimes things may get washed out. It's important to keep the contrast in there.

14 **Add depth of field** Put in some flames and smoke using images from **cgtextures.com**. Use the image as the mask as well and set it as a Screen Layer. The background for these skull images is usually kept at a minimum with just a series of gradients – you want the focus to be in the foreground. Make a copy of the image and apply an iris blur to it to add depth to the corners of the image. On top of everything add a noise layer at a low opacity to give it a slight grain effect. Go ahead and tint this layer to add some additional colour to the image.

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Create realistic tileable triple-A materials

From high-poly sculpting to baking and texturing, learn how to re-create this realistic tileable brick material for next-gen videogames

With videogames hitting high levels of photorealism, next-gen graphics will therefore mostly involve lighting, rendering and materials. Consider also that around 70 to 80 per cent of the screen space in a videogame is the environment where you walk around, and this is made out of props, modules and tileable materials. So, why shouldn't it be as important to re-create believable environments (and the textures and materials that impacts the process) as it is for interesting characters? Every pixel tells a story about the world you are in. In this tutorial we are going to learn how to create one of the materials that could be in any triple-A videogame.

> "Damage and wear and tear tell a story about the entire time that those bricks have been there"

AYI SÁNCHEZ
London bricks, 2016

Software
ZBrush, Photoshop, 3ds Max, Marmoset Toolbag

Learn how to
- Create consistent materials
- Get good references
- Do detailed sculpting
- Work on levels of detail
- Scale elements
- Determine visual hierarchy
- Define materials
- Correct weathered surfaces
- Create PBR-ready textures
- Use tileable continuity

Concept
Inspired by the city of London and games like *The Order: 1886*, the idea behind this project was to create an old brick material that could be used later on in map sections.

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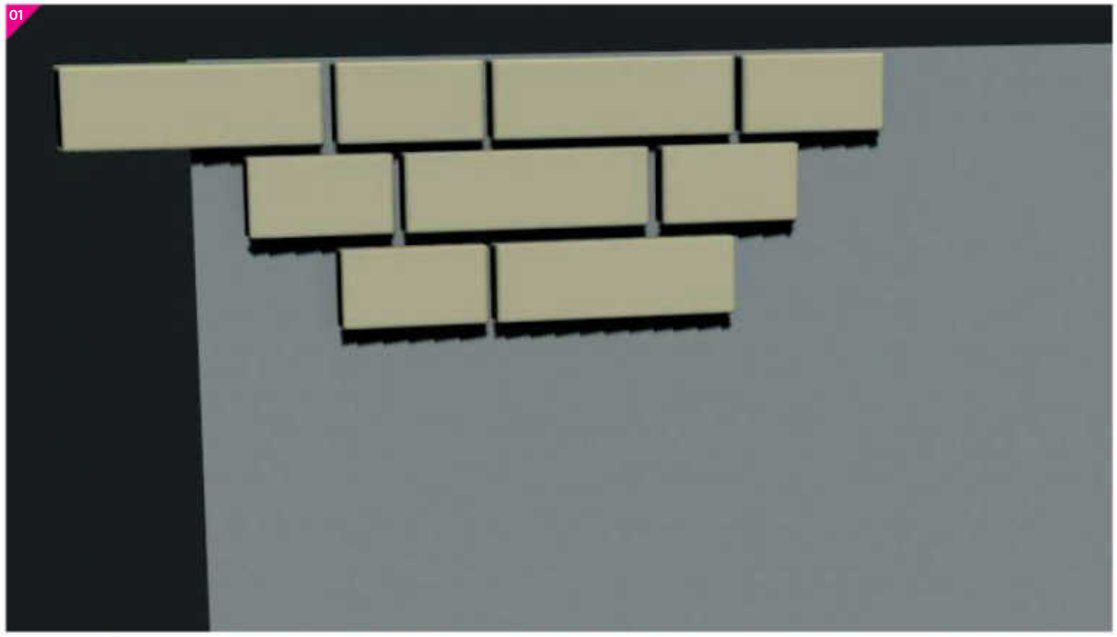
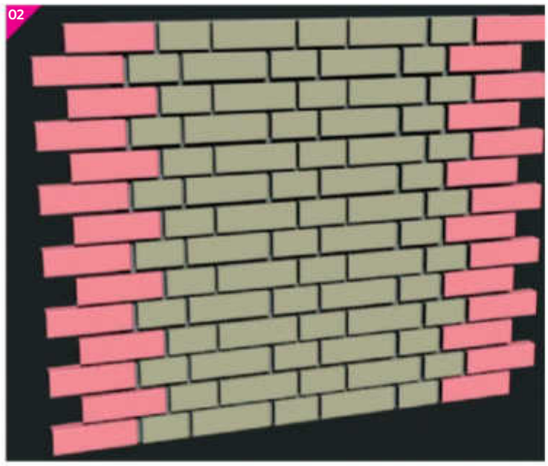
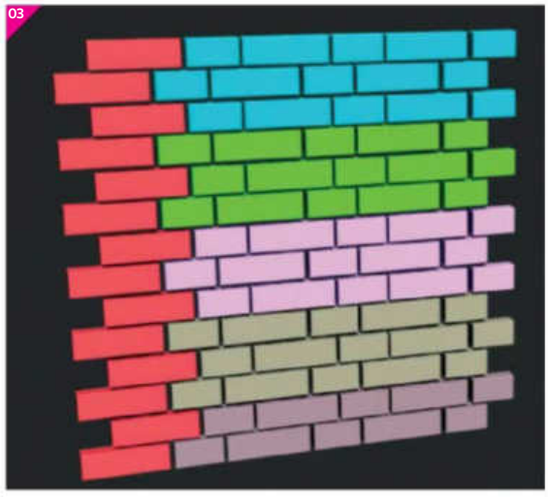
01 Block out elements Considering that your work will end up baked into a 2,048 by 2,048 bitmap, bear in mind the scale and the number of elements in it. We want to avoid losing any details that will be sculpted in the baking process. For that reason it's important to block out the elements, do an early bake test, and double-check normal maps and detail fidelity. You should start with a plane and arrange the elements, in this case the brick's blockout. Add any other elements needed, and check the scales again based on your references. Pixel density is also very important – 512 pixels per metre should be a safe choice.



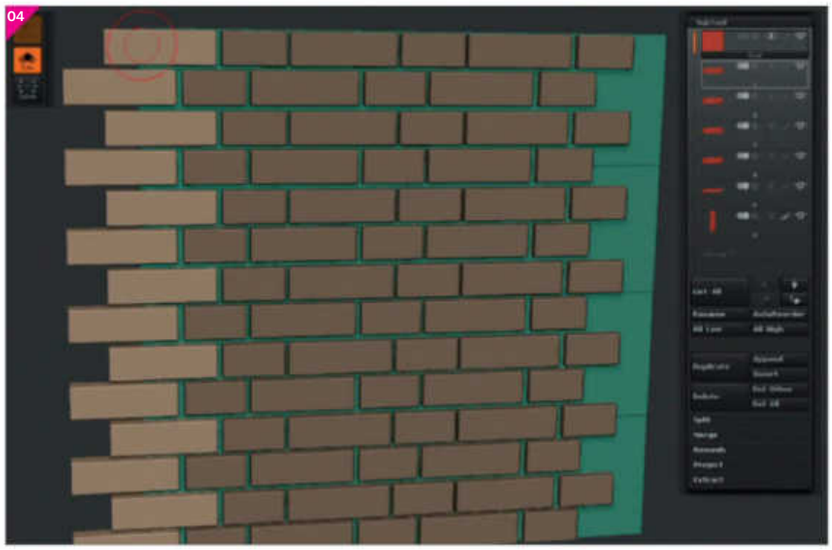


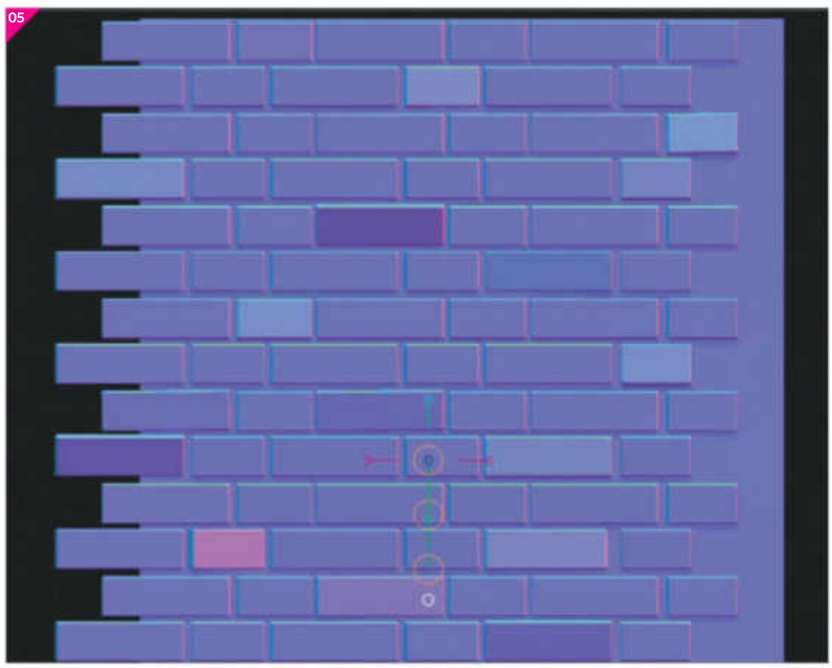
02 Tile the borders The beauty of tileable materials is that they tile! Repetition should not be noticeable; with architecture elements this is easier but it can be tricky for organic elements. There are a lot of different techniques for this, but usually the simplest is the easiest technique. Arrange the bricks that will repeat in just two of the borders: vertical and horizontal. Leave the rest empty as we will take care of them after sculpting and during the texturing stage.



03 Prepare for ZBrush Make sure you have your elements laid out in the plane; 3ds Max was used for that purpose, but you could use any 3D package of your choice. The benefits of this is that you will be able to work with instances instead of single elements. It is better to facilitate the subdivision by tessellating the meshes into a decent polycount manually. With this we will make sure we don't get stretches while detailing. Separate things by materials or, if needed for performance reasons, by parts. In this case, bricks and cement were split into different patches. Also the tiling geometry was put into a different group.

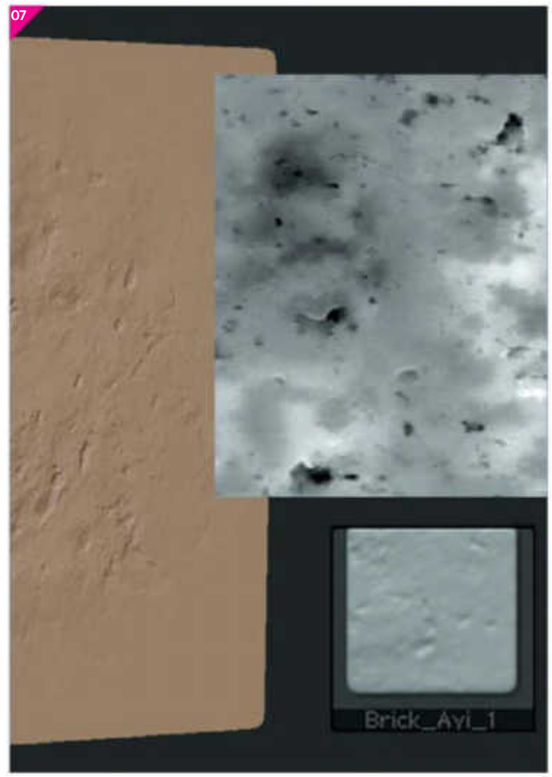
The importance of working on the big picture and composition
Tileable materials usually cover wide areas in games, such as walls or floors. It is quite a common mistake to work in a way in which you're only previewing just the space from 0 to 1. For avoiding obvious tiling repetition, it's better to tile it two or three times on a plane. That way we can spot easily where the repetition is happening and try to balance it in order to achieve a better result. Blending with other materials via vertex paint is usually used to enrich the overall composition.





Fixing the tiling

People usually struggle to make sculpted textures to tile. There are definitely a lot of ways to proceed. You can usually do this with repeated elements like bricks – the easiest way is to sculpt one vertical and one horizontal border using exported layers and then duplicate and move it to the opposite edge. We could also clone the seams in Photoshop to be completely unnoticeable.



04 Import into ZBrush Now it's time to import all the layers back to ZBrush. It's better to organise the SubTools by elements or materials. In this case, bricks were separated into four chunks so we can subdivide without crashing our machine. Also bring a copy of the plane for the mortar. Solo mode is a very useful tool for working with SubTools, focusing only on what is selected.

05 Scale and rotation It is important to have some rotation and scale variation in our bricks, as this will bring an overall randomness factor as things are usually layered in reality. Also lighting will react differently to the surface. Using the Rotation tool after masking some of the bricks, just move, scale or rotate. Don't exaggerate too much or it will look unrealistic and don't bend or deform the bricks in excess. Normal MatCap is usually a good way to check how the orientation of our elements is working out.

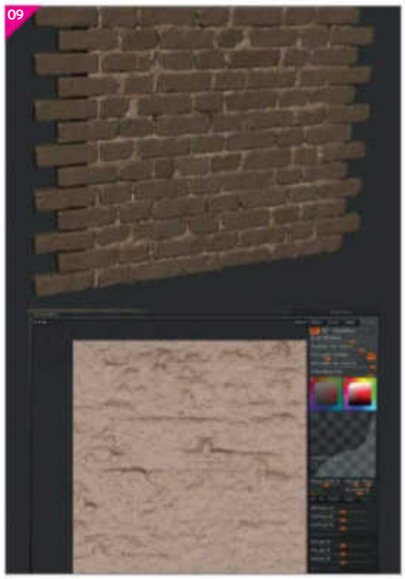
06 Sculpt shapes Using ClayTube, TrimSmoothBorder and TrimDynamic, start to wear the edges from a lower to a higher subdivision. Try to treat every brick uniquely, looking for a common pattern in the overall image but different shapes when it comes to individual elements. Leave some of the edges intact, some with rounded corners and others with sharp cuts. Damage and wear and tear tell a story about the entire time that those bricks have been there.

07 Detail with a sculpting brush When sculpting details, it is usually a good practice to analyse the surface nature. Usually black-and-white photos with a heavy specular component are good for giving us an idea of how porous or smooth it could be. With this in mind, create a couple of sculpts on a plane using the details you need for mimicking the material surface. To grab the depth of this, a brush was created so we could detail the bricks.

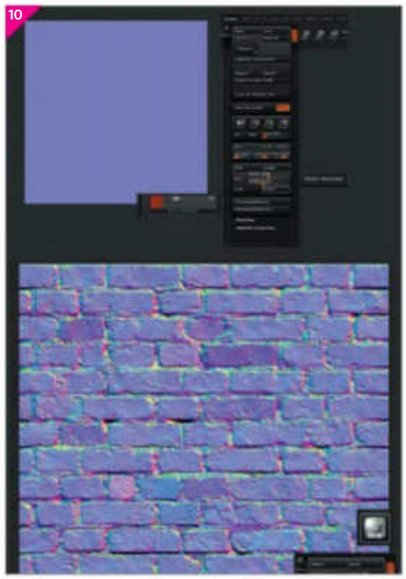
Enrich the material and avoid noise

Materials in videogames shouldn't be boring, they should contain enough information to represent the surface faithfully without creating noise. Analyse all the layers that compose real-life elements carefully, but also all the other layers that bring it all together (moss, rust, stains, dust and so on). The final goal is to have a good balance between rich and heterogeneous elements, with slightly exaggerated distribution through the texture. Putting too many elements in will lead us to our main enemy, noise. Finding this harmony between the elements is what makes texturing so difficult and yet so rewarding at the same time.

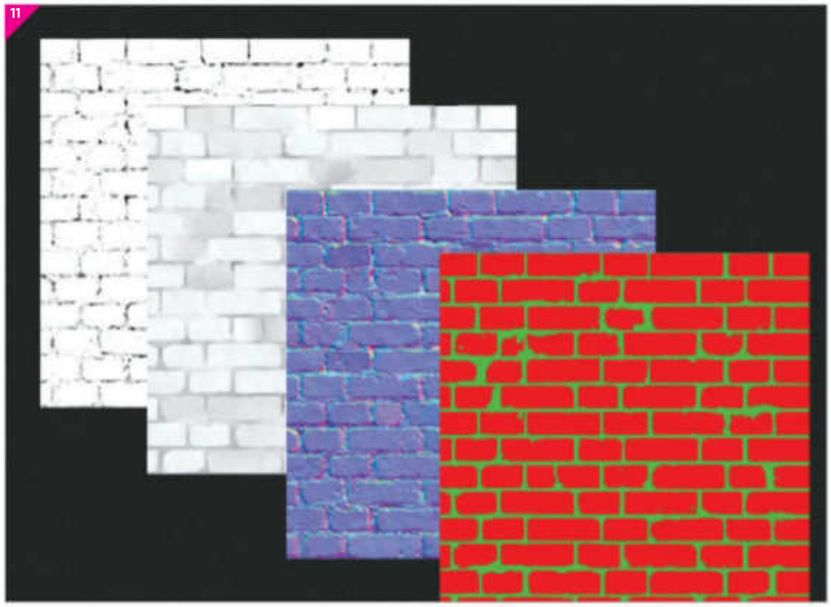
08 Detail the bricks Using the brushes, work on each brick. Cracks and small crevices were obtained from photo sources. It is better to work through stages depending on the scale of the detail: first do some big porosities, after that some mid-level details and finish with some cracks and holes. Working this way will avoid losing sculpted details. Saving layers for each level will be beneficial.



09 Sculpt mortar Duplicate the plane and subdivide it. Using the ClayTubes and the Move brush, pull and push it to get through the bricks. Add some variation in the bumpiness – it needs to feel real. Surface Noise is great for adding grain detail, combining passes with different scaling and morph targeting to help achieve good results. Play around with the curve for better results. Use the Move brush to overlap mortar over some bricks to give interest to certain areas.

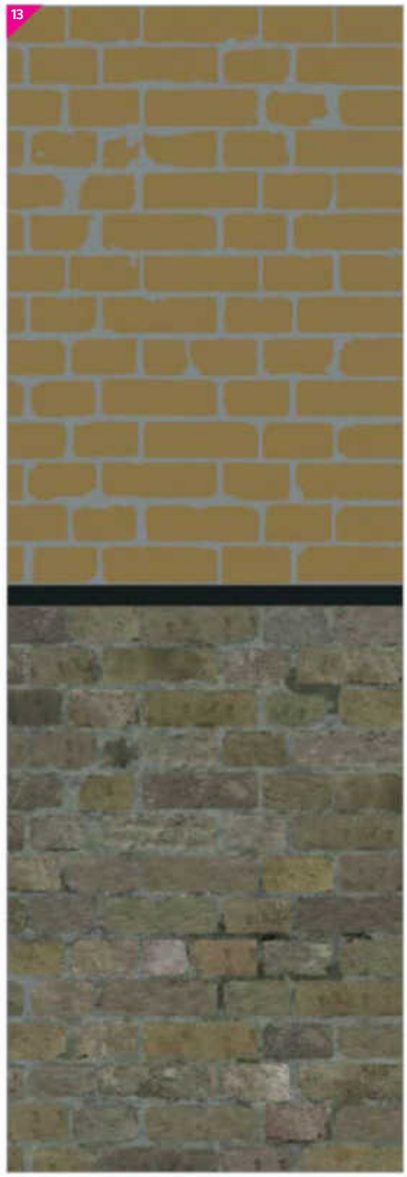


10 Normal map bake test Once we're happy with the sculpt, do a bake test inside ZBrush in case we need to change any details or composition. Create a new document with 2,048 by 2,048 dimensions, and go into Solo mode with the original plane we exported. Fit it into the document pressing F, and ensure that you aren't in perspective mode. Exit Solo mode and the whole document should be fitted. Using BPR render and a normal map MatCap, export a screengrab with ZAppLink and test it in a game engine.



11 Bake and prepare for texturing Once we are happy with the results, decimate all SubTools and export them to your regular baking software. It is crucial not to decimate too much geometry or we will lose details. The whole sculpt for this tutorial is around 50 million polygons; let's optimise to 12 million. Now start baking (in this case we are using 3ds Max). A normal map, ID map, ambient occlusion, height map and curvature map should be enough for the texturing phase.

> "First do some big porosities, after that some mid-level details and finish with some cracks and holes. Working this way will avoid losing sculpted details"



> It's good practice to group and name layers in the PSD by category or by hierarchy; in this case all of the masks are grouped at the top, followed by... ID masks

12 Generate masks and use Photoshop Tools shouldn't be the means to an end to any render, but the final textures can definitely help. For that there are many software available that are good options for creating textures and Photoshop is our pick for this tutorial. Using the outputs from the bake, extract some masks using Quixel SUITE/ Substance. Then just feed in the normal map, and we will get some nice masks to make use of. It's good practice to group and name layers in the PSD by category or by hierarchy; in this case all of the masks are grouped at the top, followed by the brick and plaster ID masks groups.

13 Work on albedo/diffuse texturing Use accurate albedo values (there are reference charts online for main materials depending on your software of choice so look them up, in this case we are utilising Marmoset Toolbag) and work with them using a colour fill layer. Find the right base hue by checking your references; we will use this as a guide for not getting too far away from the correct values. Photo source material is fine when not containing lighting information. We will use some different base brick photos. The Clone Stamp is useful for getting rid of details and parts that don't interest us. Using a couple of adjustment layers, match the values from the reference charts. Use opacity as well for subtlety.

14 Add colour variation Once the base has been set up, let's enrich the colours with more variation. For that, we have picked up some other interesting hues for some of the bricks, as well as some stains for the mortar. In the image to the right you can appreciate how the brick tones change from yellow through to brown. Using the ID map, select some of them to apply an adjustment layer for hue saturation. Repeat this process with different selections and opacity settings. Also, by looking at different photo sources and doing some more adjustments we will achieve even more variations on the base of the mortar. Double-check your references continuously and cross-check with the values so as to not go off the charts.

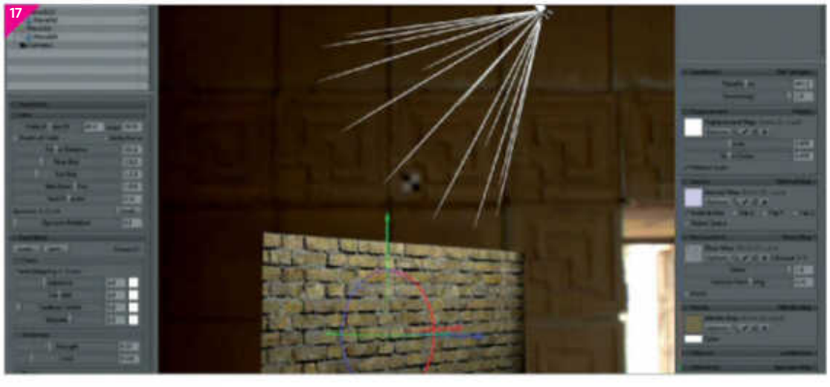
Focus on what is important

In the last generation of videogames, diffuse was almost the most important texture in a material. Nowadays, with the PBR workflow, having a good high-poly model to extract normals from is crucial in achieving high-fidelity surfaces. Have in mind that all the masking and work we do after it is based on our sculpt, so take the time to do a good job. Smoothness and specular are also very important to determine a good material definition. Don't forget about utilising correct values either, it will definitely be key to achieving an optimal result.

15 Weather the bricks together Once we are happy with the base pass, we bring it all together. For the first pass, use dust in a contrasted version of the green channel from the normal map. Use details if needed, but it is better to use solid colours and play with opacity. Mould and mossy areas are added to connect the mortar and the bricks, blending both with a invisible transition. Try to break the peak and crevice masks so everything doesn't look the same. Colour variations are welcome as well in order to achieve this.

16 Author specular and gloss Duplicate the PSD and rename it to '_s' and '_g' for each of the textures. Specular texture should be just a solid value for each material that we have. You can check these values online depending on the game renderer that you are using. The gloss map is a little more specific though. Taking advantage of the layer structure that we already have, put a black-and-white adjustment layer on top and start tweaking every detail that we have. It is good practice to include elements that are not visible in the albedo that would add some personality to the material response.

17 Render your material Presenting your work is probably as important as the rest of the process. It is also a good time to do all the final tweaks for a better final result. Import a plane into Marmoset, create a new material and plug in all the textures. Choose a neutral HDR and place a light, in this case a spot, but avoid using colours on it. Using a little bit of displacement based on the height map will help make our details pop a little bit more than just using normals.



Showcase

Ayi Sánchez

Ayi has been working in triple-A videogames as a texture and environment artist for the past five years. He has previously worked on sagas that include *Gears Of War* and *Castlevania*. Additionally, Ayi has a secret passion for characters that he tries to explore in his personal work.

Guts study,
ZBrush and Photoshop (2015)
A study exploring a completely different material from Ayi's everyday work: guts. He took advantage of subsurface scattering to accentuate material believability and behaviour.

Cobblestone floor,
3ds Max and Photoshop (2014)
This was some tileable textures work for *Gears Of War: Ultimate Edition*. It was really interesting for Ayi to work on this since it was one of his first contributions to a game.

Chupacabras counter,
3ds Max, ZBrush, Photoshop (2014)
An old wood counter, the intention was to try to keep a good balance of detailing but working with the constraints of a mirrored texture for videogames.

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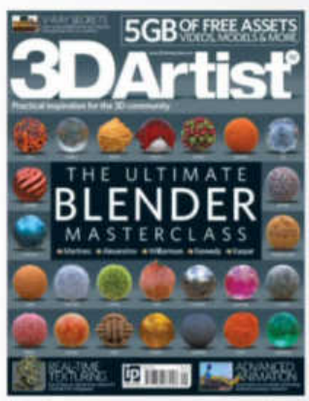

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The best artists from around the world reveal specific CG techniques

RealFlow

Vikrant J Dalal
project01studio.blogspot.in

Vikrant has several years of experience in VFX. His company Project01 Design produces 3D tutorials

KeyShot

Pablo Castaño Norkus
3dartistonline.com/user/Ltcdata

Pablo is a concept artist, 3D/VFX designer currently working in TV, videogames and film

Create a water splash in RealFlow

You may have seen water splashes many times in your everyday life, so in this tutorial we are going to take a look at how you could create a water splash effect. There are different types of splashes, for example when an object falls in water it will create splash, or when a car is going across a wet road the wheels will create splash. We are going to create a splash using a falling object.

Many big VFX and animation studios use RealFlow software in their pipeline, as this software is older, trustworthy and most importantly user-friendly. There are two types of techniques you can use to make this effect in RealFlow: one is Liquid Particles and the second is Liquid Hybrido. For this effect we are going to use Liquid Hybrido.

Before you start working on this kind of effect, you should have a good knowledge of liquid properties. You must know what gravity is, what density is, what viscosity is and so on. There are different types of liquid too, such as water, oil, mud, thick paste, paint and much more.

This is a very interesting subject, because you can't define a single, certain process to create this effect. As much as you will use your creativity and tools you will find different types of effects every time, so it very much depends on your own understanding of using tools and techniques.

01 Create the 3ds Max scene Open 3ds Max. Before you start working, remember that we are going to create a splash using a falling object. We are going to create a basic scene in 3ds Max of a falling object (animation) and water container. For the falling object we are going to use Torus and to create it, go to Create Panel>Geometry>Standard Primitives>Torus. Now change the parameters, set Radius 1 to 20.0, Radius 2 to 10.0, Rotation to 20, Segments to 20 and Sides to 10. Then set Position X to 0.0, Y to 0.0 and Z to 19.0.

02 Animate the Torus As the Torus is our falling object that will create the splash, we are going to animate it for certain frames. Select the Torus and set its Position X to 0.0, Y to 0.0 and Z to 19.0. Now go to frame 5 and turn on the Set Key button, which is located in the bottom of the viewport. Click on the Key button, which has a key symbol, and you will get the key on frame 5. After the first key don't turn off the Set Key, just go to frame 10 and change the Position of Torus, set X to 0.0, Y at

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> Turn Particle Cache on, as this is very important when applying a mesh to the particles

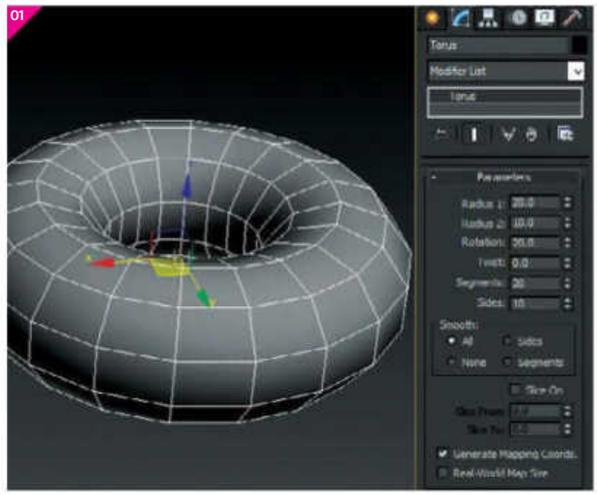
0.0 and Z to 9.0 and again click on the Key button. You will be able to see that the Torus is moving from frame 5 to 10. Now turn off the Set Key.

03 Create a container object After you have finished the modelling and animation stages for the Torus, create a container to be filled with water. To do this we will use a Box, so go to Create Panel>Geometry>Standard Primitives>Box. Now change the parameters, give Length a value of 200.0, Width a value of 200.0 and Height a value of 15.0. Then set Length Segments to 10 and Width Segments to 10. Now add an 'FFD 3x3x3' modifier, select the centre points of the FFD and push them down just like how we've done it in the accompanying image. Now add a TurboSmooth modifier with Iterations set to 1, then add the last modifier Noise and change the parameters: Scale to 25, Strength X to 5.0, Y to 5.0 and Z to 5.0. Here we have finished the container, so now it's time to send them to RealFlow.

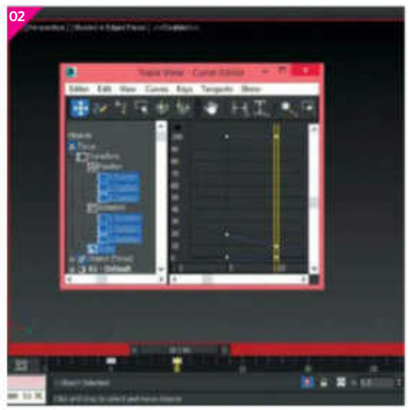
04 Export and import scene We have finished the setup of a falling object and water container, so let's export the two to RealFlow. We can do this by installing the RealFlow 3ds Max plugin to import and export data from both software. If you have that plugin installed already, then just select both objects and click on the SD File Export button, set the output path and click on the Export button. Now import the scene to RealFlow. Open RealFlow, go to the Geometry tab and click on Import. Select the SD file that we had exported from 3ds Max and you will see both geometries in the viewport. Now make some changes in the parameters: select both objects and go over to Node Params. Change the Liquid-Hybrido Interaction, set the Grid Friction to 0.3, Friction Bandwidth to 0.01 and Interaction Factor to 1.35.

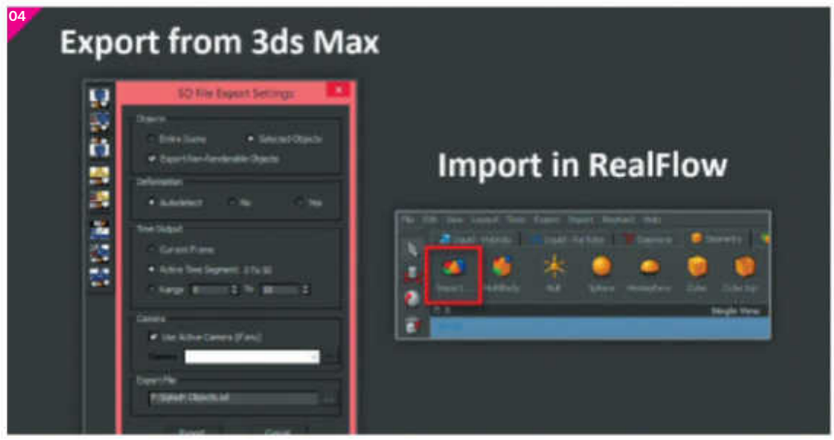
05 Set up the RealFlow scene After you have imported the objects from 3ds Max, you will be able to see that the objects are simply too big to be simulated easily. To make the simulation possible we have to scale down the whole scene, so for that go to Scene Scale by clicking on Scale Option, which you can find in the bottom-right corner. Now a new window will appear, so set the Geometry Scale to 0.0350 and Cell Size Scale to 0.1000 and click OK. Now we have to make sure that our particle cache files are going to save that simulation, and so go to Export Central where you can find the Particle Cache (.bin) tab inside the Hybrido Emitters and Hybrido Domain section. Turn Particle Cache on, as this is very important when applying a mesh to the particles and also you can use these particles in 3ds Max or other 3D applications.

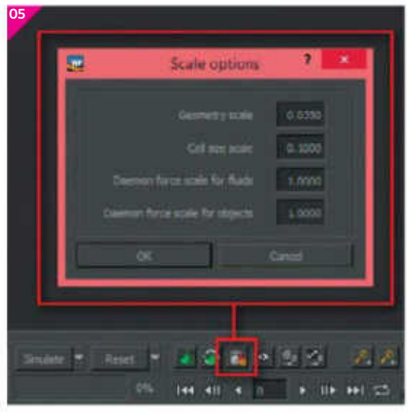
06 Create an Emitter object As we have created the water container, we now need to actually add water to the container and for that we will use a Cube and a Hybrido Emitter. So let's create a Cube first by going to Geometry. Now go to the Node Params section to change the parameters. Set Position X to 0.0, Y to 0.25, Z to 0.0, Scale X to 100.0, Y to 5.0, Z to 100.0 and then change the Simulation to Inactive, because this Cube will not interact with water.

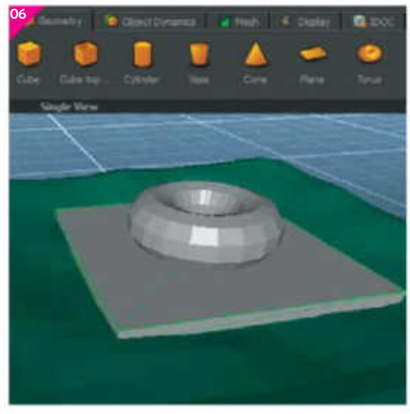


Checking references
Always observe real examples to enable a better understanding. It helps to know the behaviour of different types of splash, looks and interactions with solid objects. It helps a lot. You can use this tip for other techniques as well.









07 Make a Hybrido Emitter Now let's create the Hybrido Emitter, so for that go to Liquid–Hybrido and select Emitter. After you click on that button, a new window will appear asking you to select the Emitter Object, so select our Cube and press OK. Now if you want to change parameters, just go to the Node Params section and change them. There is no need to change parameters in this case, so just keep it as it is.

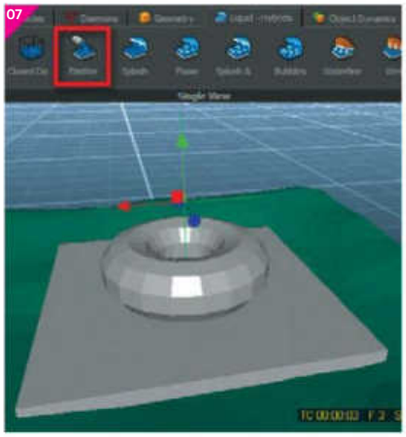
08 Create the Hybrido Domain After finishing the setup of the Emitter object and Hybrido Emitter, it's time to create Hybrido Domain – a core element of a RealFlow simulation. To create the Hybrido Domain, go to Liquid>Hybrido, and here you can see there are two types of Domains: one is Open Domain and one is Closed Domain. Click on Open Domain and you can see that it is generated in the viewport, now if you need to you can change the parameters from Node Params. For example, you can increase the Viscosity to make it thicker or muddy and then you can change the Density and so on. We didn't change any parameters.

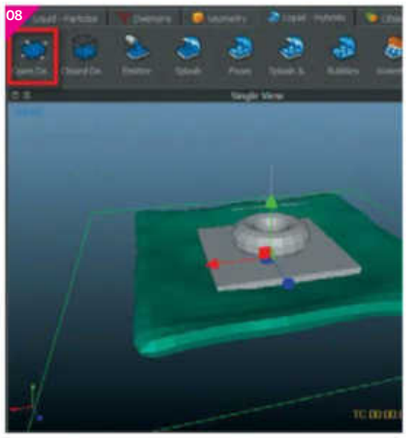
09 Generate the Gravity Daemon The Gravity Daemon is the most common daemon in RealFlow; to create this daemon go to Daemons and select Gravity. The Gravity Daemon is now generated in the viewport. You can change the parameters by going to Node Params, but we just kept it as it is. On Earth, the gravity value is 9.8 which is default in RealFlow; if you want to show water on Mars then you have to change it to 3.7, for example. So after finishing this setup just hit the Simulation button and wait three to four hours.

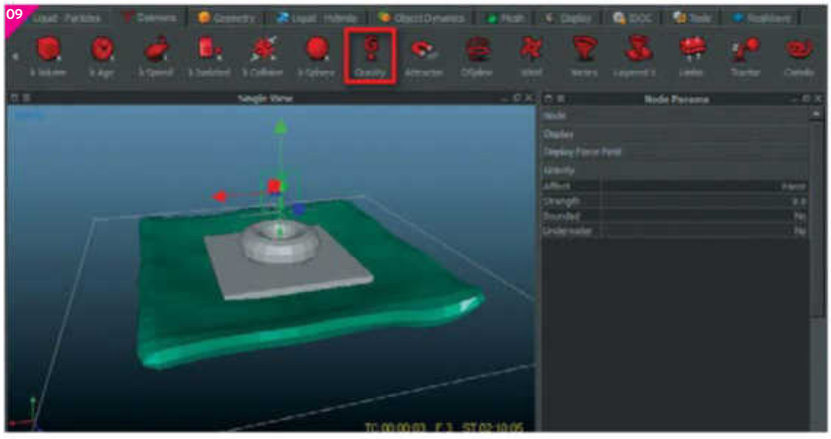
10 Set a Hybrido mesh After finishing the simulation it's time to add a mesh. The particles are not renderable and for that we need to give them a Mesh. Click on Hybrido Mesh and change the parameters by going to Node Params. Go to Mesh and set the Auto Polygon Size to No, Polygon Size to 0.02, Auto Particle Radius to No and Particle Radius to 0.03. Go to Filters and turn off the Splash Thinning Filter, set Core Threshold to 0.1, turn on the Global Filter and set the Relaxation to 0.5, Tension to 0.1 and Steps to 2. Before you hit the Simulation button, turn on the Mesh Cache (.bin) tab in Export Central. After parameters are set, select the Hybrido Mesh and Click on Build Mesh Sequence in the Mesh section. It will take around two hours to create the whole sequence.

11 Import mesh in 3ds Max After you finish the meshing, let's import the mesh as a 3ds Max file that we created earlier, so open 3ds Max and go to Create Panel>Geometry>RealFlow>MeshLoader. Select MeshLoader and drag it into the viewport. Now add a Bin mesh sequence, which you can find in your splash project folder. After doing this you will see the Splash Mesh in your viewport. Now the only thing left is shading, lighting and rendering.

12 Shade and render After importing the RealFlow mesh in 3ds Max, it's time to add shading to it, so we've used V-Ray as our renderer. You can just download a water material from vray-materials.de and assign it to your splash. There is no light in this scene, so now let's move on to rendering. Press F10 and open Render Setup, now go to the V-Ray tab and then Environment section. Add any HDRIs into the Reflection/ Refraction Environment. Then set the Output Range, Resolution and Output Path, and hit the render button. You will get the final output in one hour.

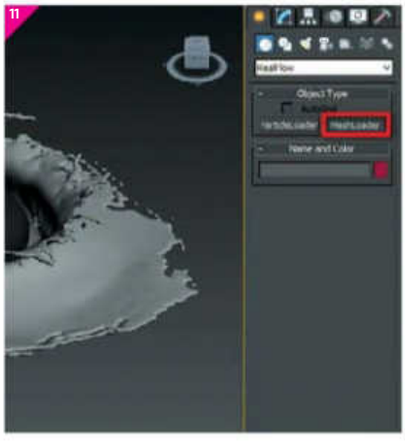


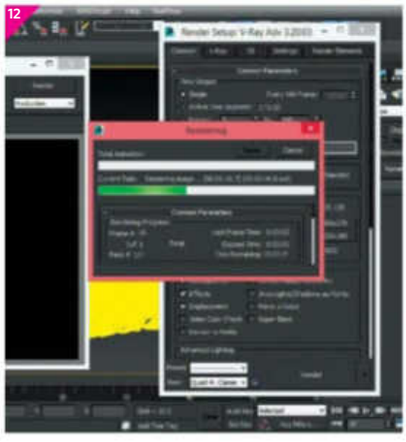




Try different types of liquids and objects

Use different objects with different sizes to see how liquid reacts. Also try different types of liquid, eg you can try putting a car wheel into mud or water or you can put some objects in oil. Try small or big objects falling in water, try different things and see the results, which will help you to improve your skills and knowledge. We also suggest that you do maximum RND.





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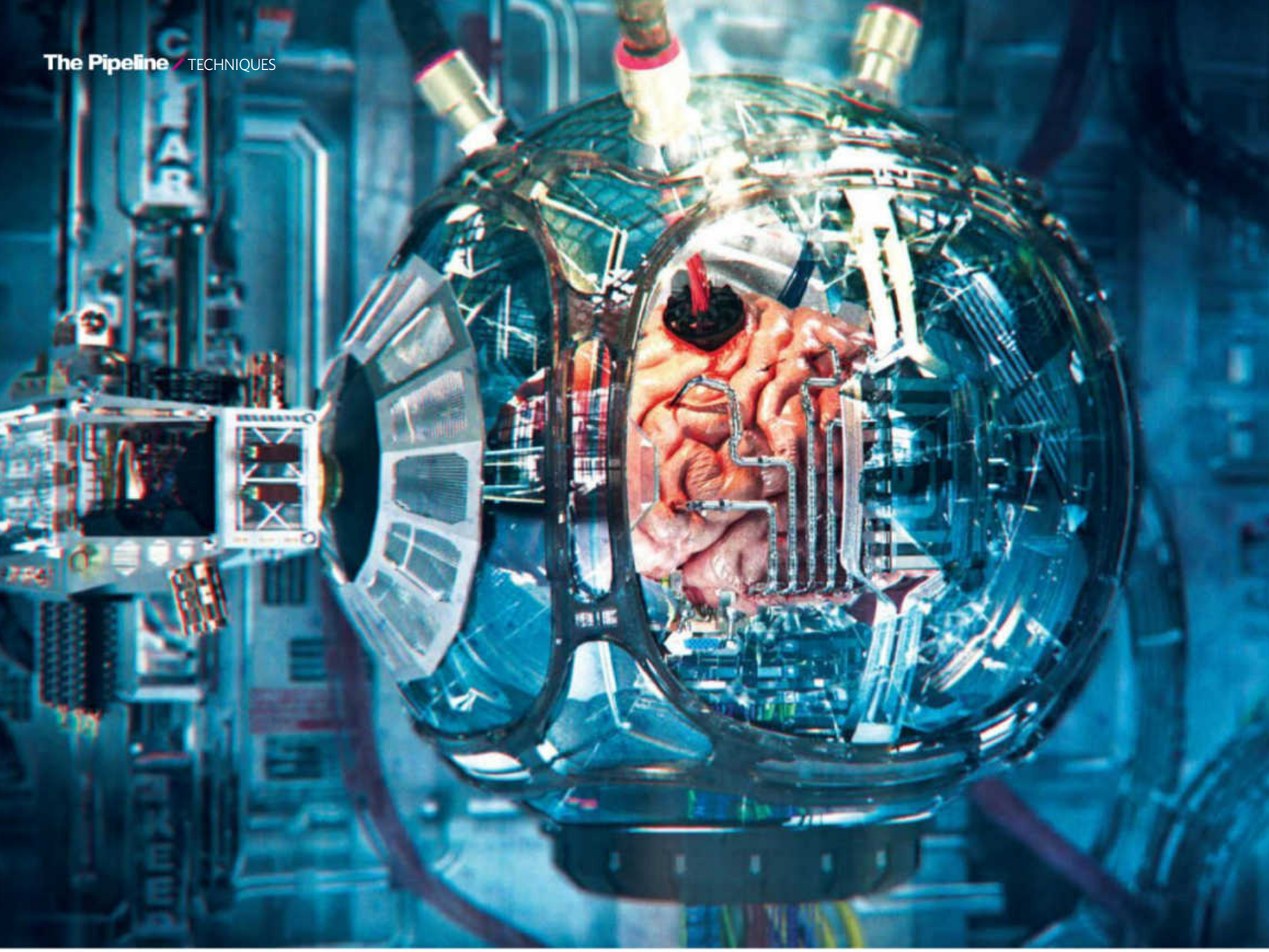

KEYSHOT

Render a broken glass effect in KeyShot and Photoshop

Sometimes you don't want to model every little detail in a concept piece, sometimes you want to have more control of your details in post-production. Therefore it's essential to know your tools as well as the basics of compositing methods. In this tutorial we are going to learn a useful technique that involves a few renders in KeyShot and a little work in Photoshop. Creating a broken glass orb can be challenging in ZBrush: you have to shell a sphere and plug a hole in it, then model every crack and sculpt the different bevels in the glass to make it appear shatter. This could take a lot of time and effort, effort that you maybe want to spend on other, more important, parts of the model. And what happens if your client doesn't like it? You have to model the glass again! We are going to skip all that effort and use images to fake the broken glass.

First of all we are going to grab a picture of shattered glass and use it to composite two different files: one with the glass itself and one with a mask representing the hole in the glass. Then we are going to jump into KeyShot to make our renders. The first and second renders will have our model information – the only difference is that the second one will not have the glass orb on it. Then we are going to render the glass sphere with two labels for the third and fourth renders. The first label will be the image of the glass and the second label is going to reveal the hole in it. We will then go back into Photoshop, where we are going to make the final composite of our image by utilising our base image, the shattered glass render and the mask render to show the non-glass image on top. It sounds complicated but this technique is easier than it seems and once you learn it, you are going to find yourself using it in some of your next projects. Feel free to create new ways to utilise the technique, improve it and modify it to create awesome concept art, new worlds and characters. And, the most important thing of all, have fun with it!

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01 Prepare the glass images First of all we have to prepare our images in order to 'break' the glass. Grab a few licence-free images of broken glass from the internet and combine them in a single image – the final image has to have a black background and some kind of hole in the middle to reveal the inside of the sphere. Make sure that you are working in high resolution. Once you have your image, export it as a JPG. Next, create a new layer in Photoshop and paint the hole section in red only. Hide the glass layer and export the hole image as a JPG after you create a white background for it.

02 Render the base images Now, in KeyShot, assign the materials to your model and render your scene. You can enable the Clown pass and the Z-Depth pass to make further adjustments to your final image. The next step is to create the image that you are going to reveal in Photoshop – for that hide the glass orb in the scene and render it in a separate file. For this tutorial we used KeyShot 6.0 Pro, and this saved all the passes of the render in a PSD file. For the second render, we took advantage of the Render Region functionality.

03 Load the glass label For the shattered glass pass, hide everything in your scene except for the glass orb. Edit the material, set the Type to Flat and the Specular colour to black. Change the environment map to All White dragging the HDRI from the environment gallery. Now, the important part – load a Label onto the material of the orb by pressing the + button and loading the cracks image from Step 1. Using the Translate options, move the image to fit your model, then scale it and rotate it. Render the image and save it with a new name.

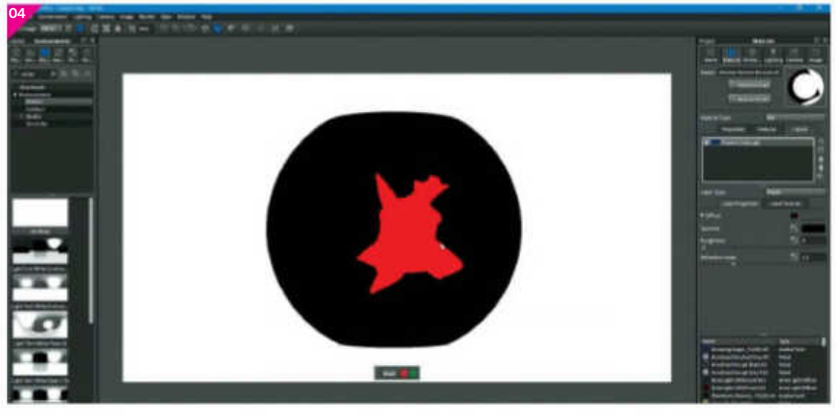
04 Create the hole With the same environment and material applied to the orb, go to the Label panel and double-click on the cracks image. Find the image of the hole and load it. You will see that the shattered glass image is replaced by the hole image in exactly the same spot. Render the image using a different name. The hole render and the shattered glass render take less than a minute to complete – if you feel that you missed the desired position or scale you can go back to KeyShot to make two more images quickly.

05 Make the hole mask in Photoshop In Photoshop, pile up your renders in this order: Base render (with the glass), Clown pass, hole pass, broken glass pass and base render (without the glass orb). Using the Magic Wand select the red colour of the hole from the hole pass and apply it as a layer mask to the base render (without the glass orb). Hide the Clown and hole passes. You can apply a curve effect to the glass orb underneath, masking the Adjustment layer by selecting the glass zone in the Clown pass and using the selection as a layer mask in the Curves adjustment.

06 Adjust and composite the glass render Using the Clown pass, trim the broken glass render using a layer mask leaving visible only the parts that you see fit (in our case we erased the parts that intersected the holder of the orb). Change the Blending Mode of the broken glass layer to Color Dodge and apply a layer mask to it. Now, pick an irregular brush, lower the opacity of the stroke and gently paint with black on the layer mask – this will erase parts of the hard reflections and refractions that you see in the layer. As always, add some fog, some flares, a colour adjustment and you're done! You have now made a concept with broken glass effects.

Glass material variations in KeyShot

KeyShot gives us a lot of options for glass materials, and these materials are awesome to work with but we have to be aware that we can face one or two issues with it. First is the render time – if you increase the refraction of the glass or enable the caustics you are going to have to deal with rendering time that is three or four times as long. Another possible issue is colours: some textures or colours are not going to be accurate behind a glass surface, especially the ones generated with the AO shader of KeyShot 6.0.



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Chillblast Fusion Atlas

A Micro-ATX system that costs less than £1,000 – is it possible for this low-cost machine to be a good performer too?

The Chillblast Fusion Atlas is one of the least expensive workstations we've ever reviewed, at around £935, which says a lot about the high cost of computer hardware suitable for rendering these days.

You can never really have enough computing power for 3D software. There's always more detail to add or a renderer setting to enable that can grind performance to an agonisingly slow pace. But with more realistic aims, and knowing the kind of resources that your software demands, you can get by with something that will only make a minor dent in most bank balances, rather than empty them.

The quad-core Intel Core i7-6700 in the Fusion Atlas isn't exactly the fastest chip that money can buy, but it's certainly far from lacking. It's not possible to overclock a non-K series Intel processor, so it's running at the default 3.4GHz (4GHz Turbo) clock frequency. But as it's based on Intel's ever-efficient Skylake architecture and handles eight threads, it can still tackle CPU-based rendering jobs very well.

The 2GB Nvidia Quadro K620 GPU is Nvidia's entry-level workstation graphics card. Professional-grade GPUs are astronomically more expensive than gaming cards, for a variety of reasons that include certified drivers, ECC memory and (arguably) greater longevity. Trouble is, the high-end cards cost more than every other component in the Fusion Atlas combined, so Chillblast has been sensible to keep things affordable for this default configuration.

And the rest of the system will not let you down. We added a small 120GB SSD to the build (an essential, these days) for an extra £35, which comes with Windows 10 installed and joins a 1TB hard disk and 16GB of system memory. Nothing excessive there, though you can opt for higher capacities for a small extra outlay, but unless you fill the hard disk with media or install loads of games, you shouldn't run into problems with this for 3D work.

Based on its specification, it's fair to predict that CPU-based rendering will go smoothly on this configuration of the Fusion Atlas. It won't, however, cut the mustard for heavy CUDA or OpenCL performance, unless the graphics card is upgraded to a more powerful (and more expensive) model.

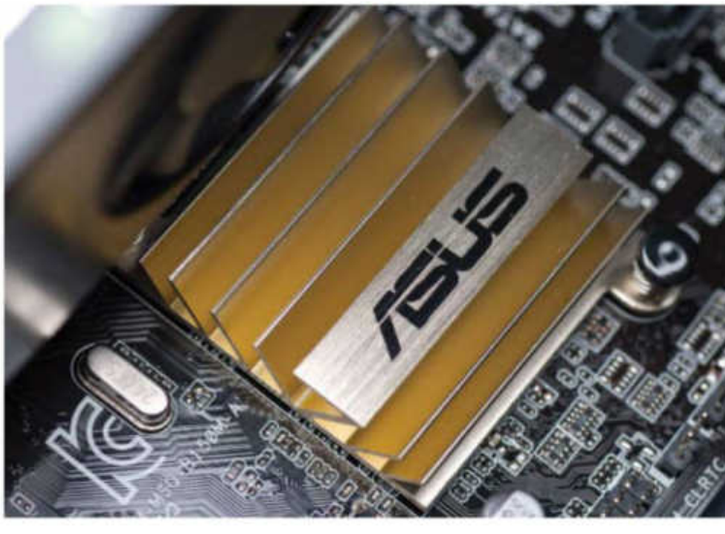
CINEBENCH 15 delivered a CPU score of 815, whereas the 3ds Max rendering took three minutes and 42 seconds for the demo underwater scene at default resolution, and a result of 13 minutes and 49 seconds for the HDTV preset.

Meanwhile, we weren't expecting the Nvidia Quadro K620 to be capable of great performance, and it pales compared to bigger cards as the SPECviewperf results were below par. The Maya score of 16.16 is about half the result expected from a high-end mobile GPU, like the M5000M in the Lenovo P70, although that mobile workstation costs a lot more than the Fusion Atlas.

These are all competent, if not record-breaking results and they're also very much in line with what we'd expect – they're still good to see from such a small PC though. Perhaps most impressively, the Chillblast Fusion Atlas is housed in a really tiny Micro-ATX Ace Ecco case, measuring less than 40cm across. It uses a stock Intel cooler, so it's not exactly silent in use, but it's not loud either. It's a small but efficient rendering box that delivers decent CPU performance.

But there's no hiding the fact that for great graphics performance with a professional-grade Nvidia Quadro or AMD FirePro GPU, you'll need to spend more.

Orestis Bastounis



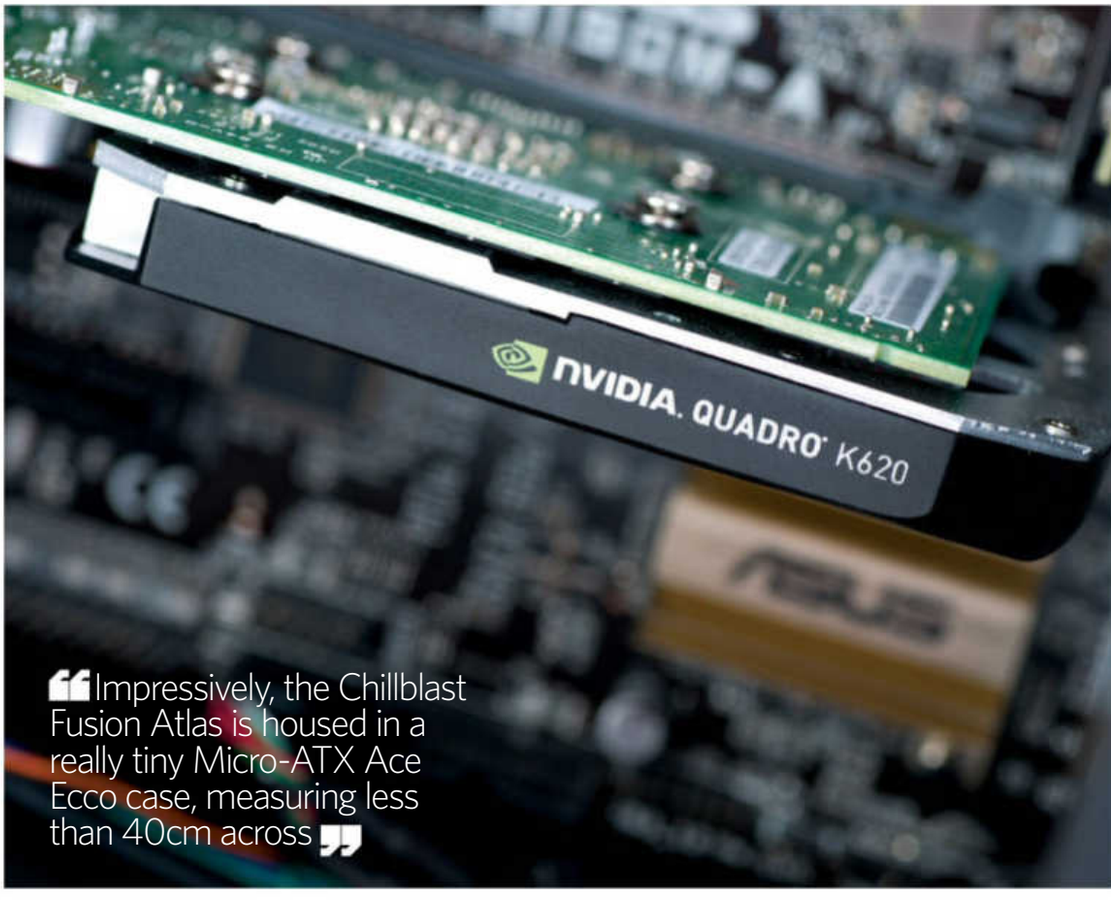
MAIN The Chillblast Fusion Atlas sits inside a Micro-ATX Ace Ecco 235, which is encased with a solid black finish

BOTTOM LEFT Two USB 3.0 ports are included in the back alongside a USB Type-C port

BOTTOM MIDDLE The ASUS B150M-A motherboard can be swapped out for others with multiple graphics support

BOTTOM RIGHT A stock Intel CPU heatsink and cooler means that the workstation isn't exactly silent, but it does the job

BELOW Nvidia's Quadro K620 is a basic, entry-level option and has a 2GB memory size



"Impressively, the Chillblast Fusion Atlas is housed in a really tiny Micro-ATX Ace Ecco case, measuring less than 40cm across"

Essential info

Price	£935
Website	chillblast.com
CPU	Intel Core i7-6700
GPU	Nvidia Quadro K620
RAM	16GB DDR4
SSD	120GB Samsung 850
Hard disk	Seagate 1TB 7200RPM

Summary

Features
Performance
Design
Value for money

Verdict

If your main work is with CPU-based rendering, then a great slimline system like the Fusion Atlas is perfect

V-Ray 3.3 for Maya 2016

Chaos Group improves its collection of high-speed production quality rendering tools with this Maya release

Following in the footsteps of the V-Ray 3.3 3ds Max release in 2015, counterpart V-Ray 3.3 for Maya is now available. Described as bringing the pair on par and the biggest update to Maya yet, we couldn't resist taking a look. As with the Max edition, substantial speed increases are the driver for this free Maya update, coupled with a stack of new features. The UI hasn't escaped a makeover too, becoming more simplified and user-friendly with several menus, panels and the shelf being updated. For beginners, there are quick settings with four presets for VFX, arch-vis exterior/interior and studio environments that will hopefully get further expansions, although you can create your own presets too.

The new variance-based adaptive sampler (VBAS) doesn't disappoint, giving less noisy results in testing. The VBAS automatically samples lights and materials, doing away with the manual optimising workflow, which in itself is a vast time-saver in terms of setup, especially for complex scenes. For final frame production rendering, V-Ray RT GPU is now available, but doesn't currently support distributed rendering.

Two at-render-time modelling tools have been added; the first is VRayClipper, which has been expanded to allow custom geometry to affect other meshes with options to either subtract a section or keep only the section inside the custom geometry. Setup is simple, just group the VRayClipper with the custom geometry then choose which meshes to affect, and the resulting Boolean gives accurate results. Greater control over the texturing of the new faces could be useful in some circumstances, for example if your model was a slice of an apple. The other is Ray Traced Round Edges, which again is easy to set up. Select a mesh and then choose the 'Round edges' attribute, enable it and choose the radius you want. The results mimic bevelling round edges by hand accurately and it's a lot less laborious than having to do extra modelling.

For texturing, VRayStochasticFlakesMtl adds extra bling if you need realistic sparkles for snow, car paint or sand. To get the most from this shader you'll need to pay extra attention to your lighting setup and use multiple light sources to catch the angles of the flakes. With car paint, which already has flakes, it's an ideal option to break up noticeable uniform patterns you may have. Triplanar mapping lets you apply seamless textures without UVs; the new V-Ray falloff texture works based on the falloff direction to provide falloff and fresnel effects for surface reflectance – both useful enhancements for an automotive rendering workflow.

Faster volume rendering is now enabled for VFX work and it also now supports OpenVDB caches from Houdini 15 and FumeFX via probabilistic volumetrics – this is essentially an Overrides checkbox in Render Settings where you can control the number of samples. Probabilistic sampling starts to perform better for denser volumetrics and during testing we found that where the smoke is quite transparent the probabilistic sampling doesn't offer significant advantages, instead it bumps the rendering time in our case from ten seconds to over a minute with it active. It's worth checking your heaviest frame using both options prior to batch rendering. To complement VRay Sun and Sky, the Sky Model Hosek et al offers more natural-looking skies while VRayAerialPerspective adds atmospheric depth effects based on distance and height. We had better results with larger scenes that had plenty of scale over close-up shots. There's plenty more we've not had space to cover, but suffice to say this update is well worth having.

Paul Champion

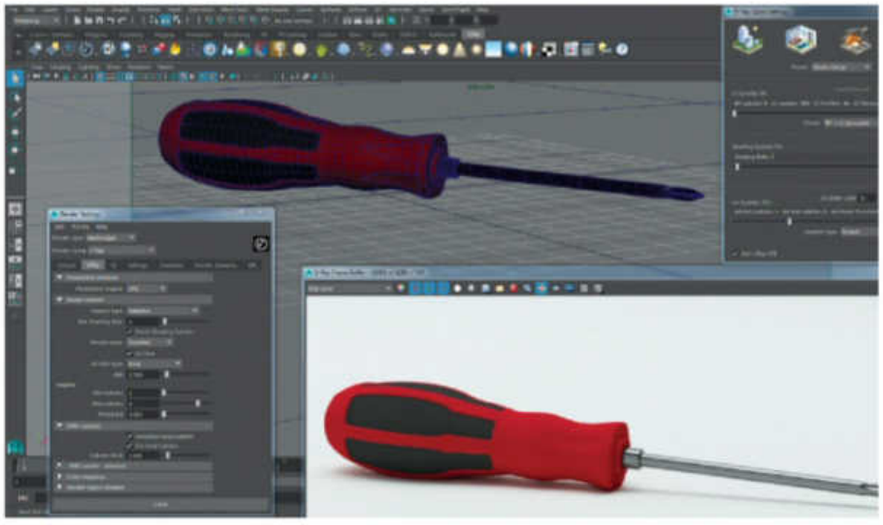
MAIN Take as many slices of pizza as you want at render time with the upgraded VRayClipper tool. Pizza model kindly provided by **CGAxis.com**

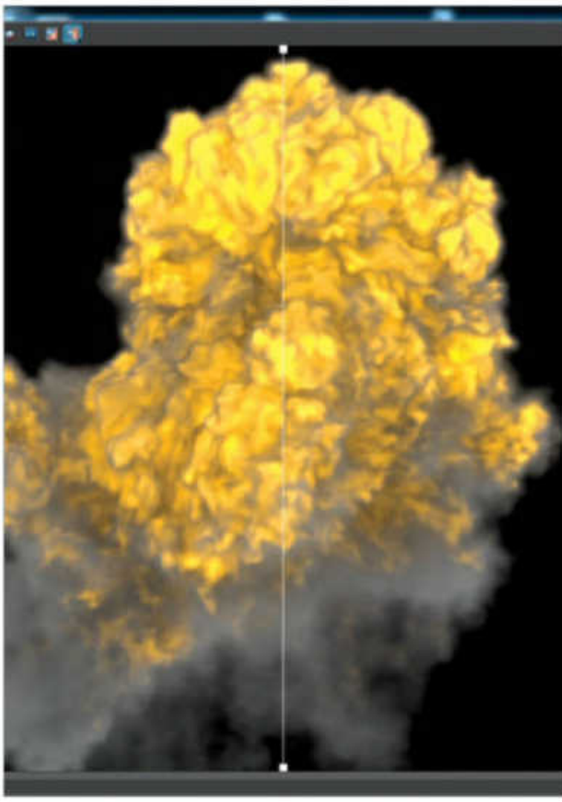
BOTTOM LEFT A huge timesaver, 'Round edges' bevels edges at render time to save having to manually model them

BOTTOM MIDDLE Probabilistic volumetrics can save time when rendering denser volumetrics, but can have the reverse effect in simple setups

BELOW Black-and-white renders are less dense as probabilistic volumetrics doesn't improve render time, but here it does improve render time

> "The new variance-based adaptive sampler (VBAS) is included and doesn't disappoint, giving much less noisy results throughout testing"





Essential info

Price	£650 / $1040
Website	chaosgroup.com
OS	Windows 7 SP1 and up 64-bit only, Mac OS X 10.9.5 and up 64-bit only, Linux 6.5 WS and up
Compatibility	Maya 2012 and up
RAM	4GB and 4GB swap minimum
CTCP/IP	Only IPv4 supported

Summary

★★★★☆ **Features**
★★★★☆ **Performance**
★★★★★ **Design**
★★★★★ **Value for money**

Verdict ★★★★½

As a free service pack, V-Ray 3.3 for Maya 2016 is a worthwhile update that is packed with new features and it's faster, too

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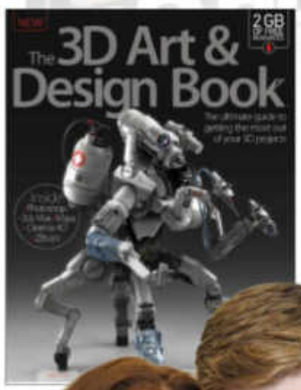

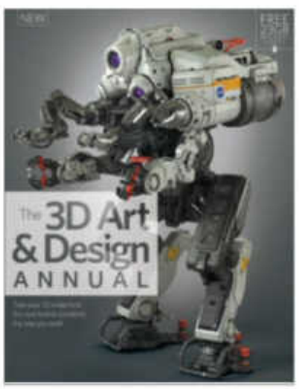

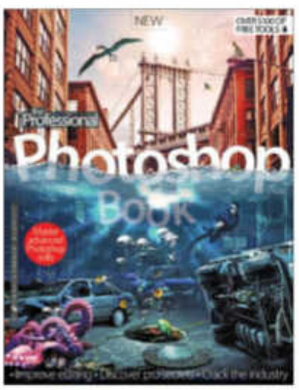

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The Hub

The inside guide to industry news, VFX studios, expert opinions and the 3D community

> "This is a people industry: it doesn't matter how pretty the pixels you put on the screen are, or who's clicking those pixels – there are always people behind them"
>
> **Hasraf Dulull,** writer/director

080 Community news

Blender connects to the Cloud

We talk to the people behind the stunning Blender animated features about their work and successes

082 Industry news

Maya 2016 Extension 2

Has Autodesk abandoned its annual update? Find out what's happening with Maya

084 Industry Insider

HaZ

An artist that proves if you've got the talent, you'll go the distance – we sit down with Hasraf Dulull

094 Social

Readers' Gallery

The latest images created by the **3dartistonline.com** community

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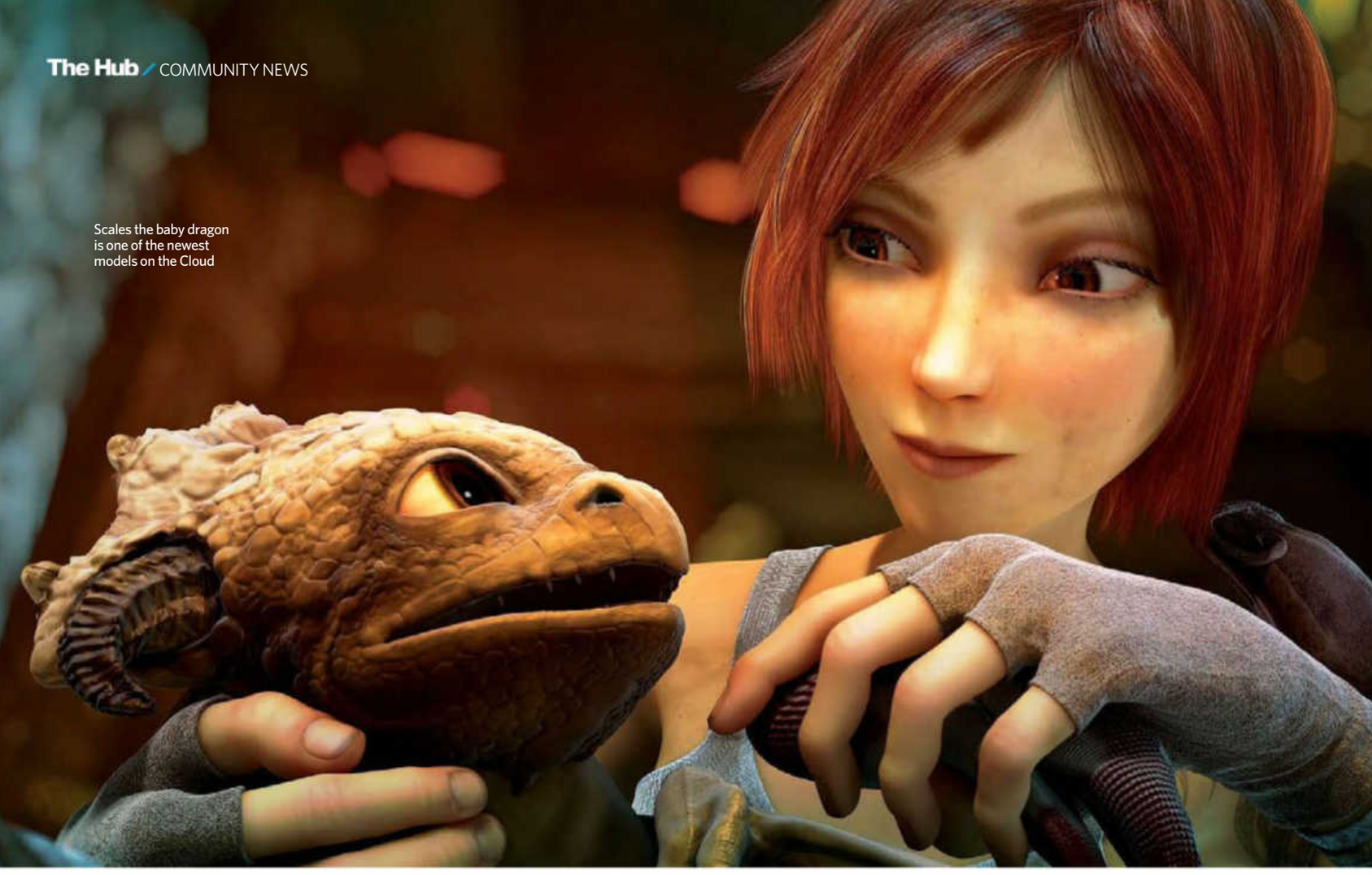


Scales the baby dragon is one of the newest models on the Cloud

Blender connects to the Cloud

The open-source 3D tool has made one of the most important updates in years to its Cloud service for community-powered projects

The Blender Cloud has been a major part of the Blender Institute's service for a good few years now, having been initially set up so artists could collaborate on 'Project Gooseberry' – the open-source endeavour that would eventually become the animated series of shorts, 'Cosmos Laundromat'. This was a fantastic proof of concept for Blender's cloud-based capabilities, and in April 2016, 'Cosmos Laundromat' was even shortlisted for a 'Webby' (think of them as the Oscars of the web world!)

This month, however, we've seen the Amsterdam-based foundation step up its game with the announcement and subsequent deployment of Blender Cloud Services. The prototype add-on will enable anyone using Blender to browse and download online textures – this is perfect if you want to preview various directions for your project to go in, or if you're trying to save some space/computational power on your workstation.

But Blender is refusing to stop there – this early preview is a taste of what's to come in a full version: Blender is aiming to enable users to upload and manage their own files in the Cloud, too, making collaborative projects more intuitive and streamlined than the software has allowed before. You often hear criticisms levelled at Blender's UI, so this sort of refinement shows the foundation's willingness to learn from feedback and cater to its subscribers.

Speaking of subscribers, Blender announced that memberships to its Cloud platform had grown from 1,750 to 1,950 since the new features were announced. It's worth remembering that in open-source tools like Blender, the more people using it, the more content everyone else will have to get creative with. It's refreshing to see Blender foster this kind of community spirit when it comes to generating 3D platforms and projects.

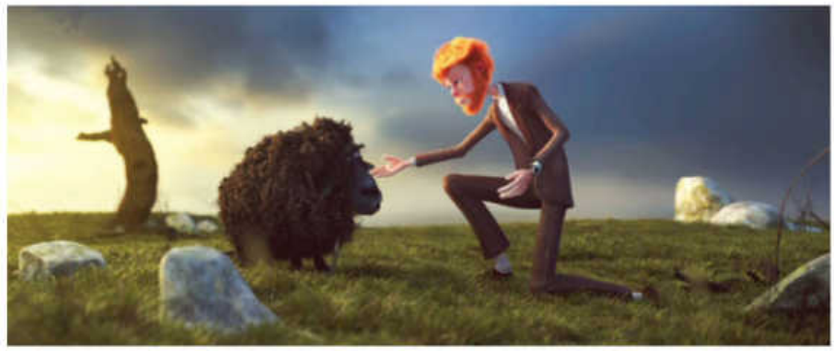
To that end, we're seeing more Blender projects released as the result of the funding that Blender Cloud can provide: most recently, we've seen the release of Vincent – a free, premade, high-quality character that's open to anyone on the Cloud who wants to practise their animation skills. Designed by Matias Mendiola, modelled by Andy Goralczyk and rigged by JP Bouza, Vincent will be part to the growing list of models in Blender's Character Library. The newest update also includes an updated rig, Cycles shaders by

Pablo Vazquez and a character from the openly developed movie *Sintel*: Scales the baby dragon (pictured opposite).

The Cloud has also recently been the driving force behind the short film 'Barbershop' – featuring famous Dutch cartoon character Agent 327 (proof that Blender's appeal is spreading beyond just the 3D hobbyists). This passion project for the team came after the Blender team got caught up with their 'tutorial duties' on the Cloud – that's another thing you know that you can rely on once you are a part of the Blender community: consistent support and guidance for the software.

It's clear from the regularity and size of these updates that Blender's community is at the heart of its operation; the Foundation shows no sign of slowing down its progress, teasing a slew of new projects coming up in the next few weeks – from 'something about VR' to a new short film project. We urge anyone interested in making a career out of VFX and 3D to swing on over to **cloud.blender.org** and get involved in one of the many projects listed on the page – you never know, your collaborative work there could land you a job in the future.

This is Vincent – another poseable character Blender has released for artists to use if they subscribe to Blender Cloud



'Cosmos Laundromat' is one of the most high-profile open projects to be created using the Blender Cloud

Brennan Letkeman used Blender to design and create this stylish headphone holding stand, totally for free!

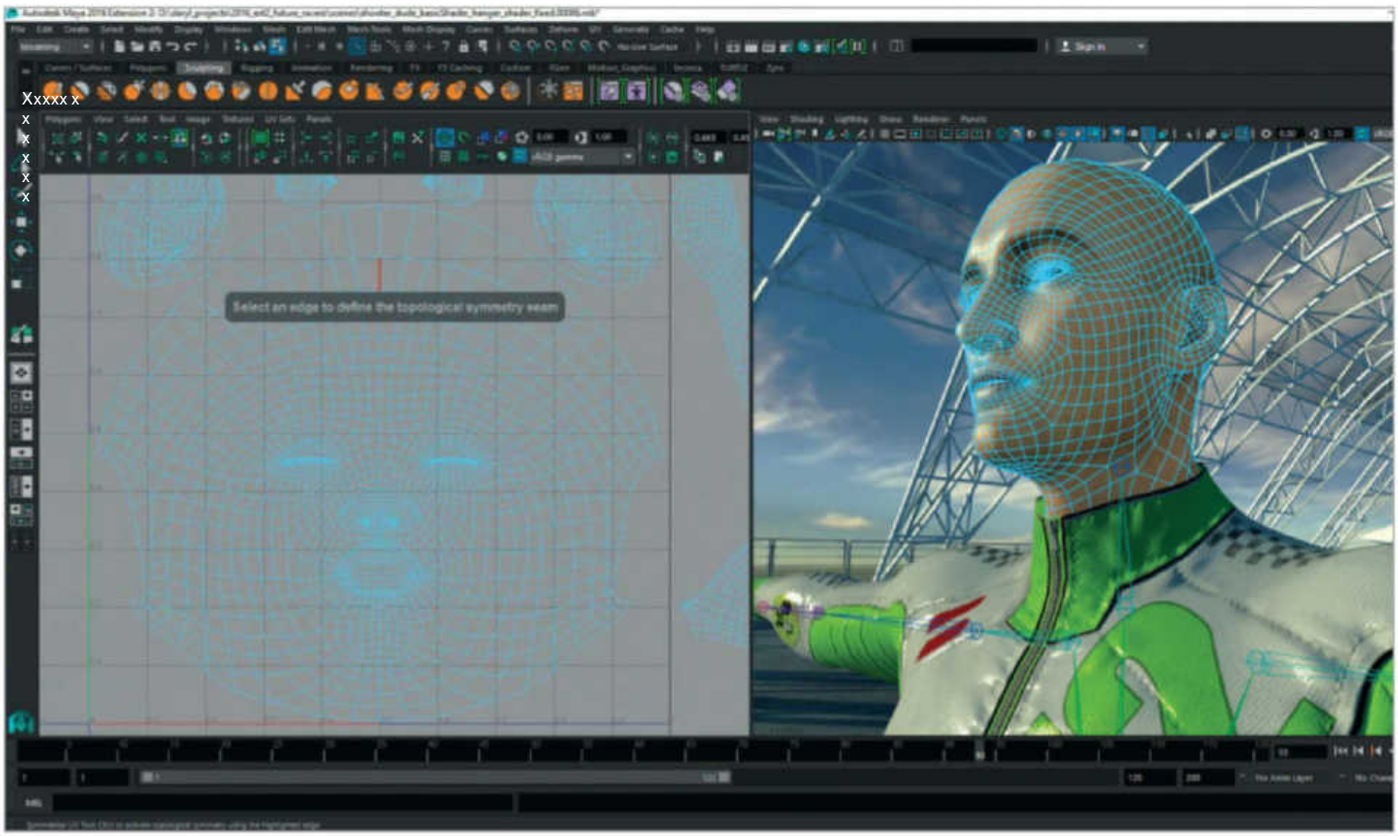
Prototyping products in Blender

Industrial designer Brennan Letkeman explains how Blender can be used for product development

Why did you opt to use Blender for this product design, rather than traditional CAD software?
Speed primarily. I wanted to mock up ideas really fast. Loose and parametric modelling, while powerful, tend to be fiddly affairs with entering numbers even as placeholders to make geometry. I knew I wanted something swooping and more organic, which can be done with surfaces in CAD programs but I've never found them to be terribly intuitive or fast.

Did it take a long time for you to figure out how to convert from a 3D model to a printable format?
I can't take much credit for that at all – the second program, 123D Make, did all the heavy lifting of taking a solid model and slicing it up to make the vector patterns for laser cutting. It's also free, so it seems like a handy little tool to keep around.

Would you recommend other people use Blender for this sort of project?
There's a lot of cool stuff you can do with laser cutting that would be impractical with, say, 3D printing just because of the scale and speed. The biggest thing you lose is detail control: because you're not having to enter numbers for every single little thing. The headphone holders work because the margin of error for headphones sitting on a curve I made up is pretty flexible – the curve could be roughly anything and still work.



What's new in Maya 2016 Extension 2?

Maya drops the 2017 label (for now), but 3ds Max enjoys a 2017 upgrade

Maya's biggest upgrade is a new motion graphics toolset that makes use of the Mash add-on that developer Mainframe North put a lot of groundwork into. The update also saw improvements to Bifröst and XGen, with significant changes to render management and character rigging toolsets.

'Create, Connect, Compute'

At NAB 2016, Autodesk laid out its 'create, connect, compute' mantra: Maya and Max have been filling that 'create' space for a while, whilst the company's takeover of Shotgun two years ago reflects the 'connect' part. The most recent purchase Autodesk has made – acquiring Solid Angle – will go towards finalising the 'compute' facet.

The Mash add-on, acquired by Autodesk in September 2015, provides a catalogue of 27 nodes that can be linked together to achieve a massive range of motion graphics effects – all of which work fluidly with Maya's Attribute and Node Editors. Autodesk has fiddled with the Mainframe North formula a little, but the biggest alterations you'll see are in the UI and menus – the functionality remains the same. Autodesk's acquisition of Mash and its developer is a clear indication that the company wants to make more headway into the motion graphics market – and this is a good start.

The new render management system has been designed to streamline your work when it comes to setting up shot-based overrides for the lighting/shading aspects of a scene. An artist can now arrange assets into collections and assign render layers to groups of items at a time, which can be easily toggled.

We're seeing some more of the Maya LT feature sets get introduced to the main software, too: LT was a 'lite' version of the program intended for independent studios, but some of the character rigging tools included in that build have been so successful that they have been incorporated into Maya's newest extension (the semi-automated Quick Rig tool is a particular timesaver for rigging artists in film and videogames).

Bifröst has seen some pretty significant changes, as well: there is a new adaptive solver that enables artists to cherry-pick the part of a simulation they want to preview or calculate. Want to create a ferocious wave in the foreground with minimal work on the ocean scene behind whatever object the wave is crashing against? Bifröst can work that out in a cinch now, saving you time and saving your computer's resources for whatever else you've got cooking in the scene.

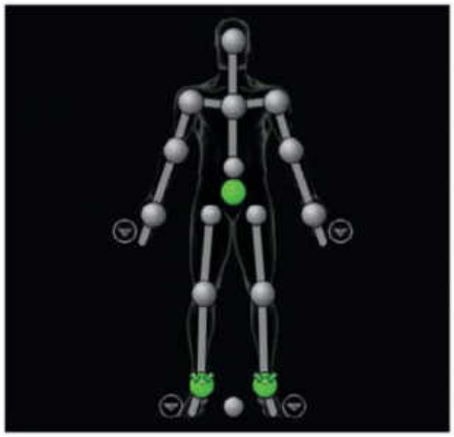
HAVE YOU HEARD? Houdini's 15.5 update will let artists use third-party software to render with the software

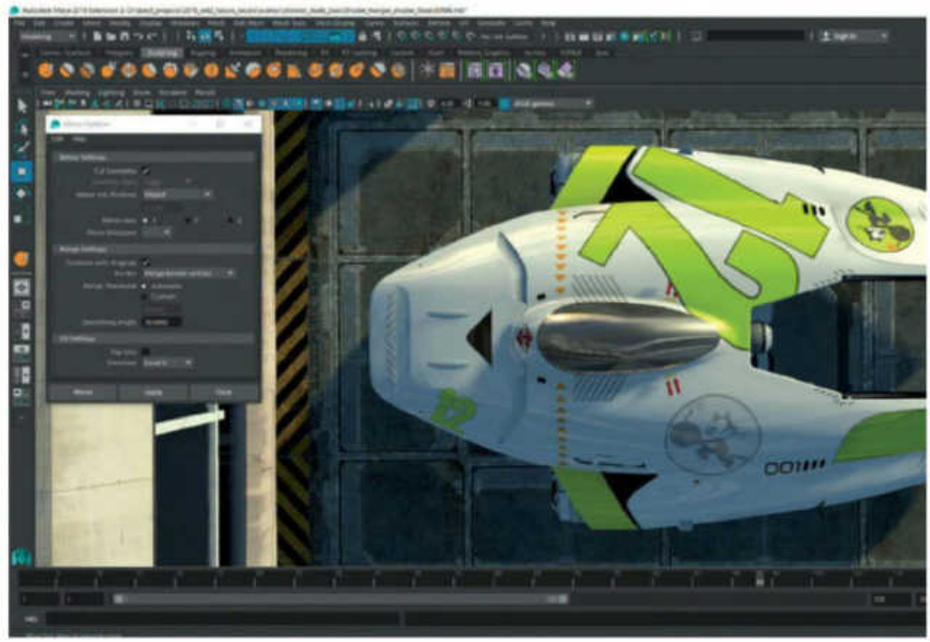
Similar improvements have also been made to XGen – the toolset can now understand 'hair cards' rather than having to interpret every individual strand on a character's head; a useful feature if you're filling up a level with NPCs in a computer game when working with a real-time environment.

When Maya 2016 was initially released, one of the software's biggest improvements was the way that you could evaluate complex character rigs. This has been improved again with Extension 2, mostly by focusing on improving draw performance on multiple meshes simultaneously, and using GPU-acceleration on deformation as standard.

Autodesk has stated it's considering moving away from a strict annual schedule (so wave goodbye to those regular April updates). We may be seeing more of these extensions in the future – it's a business model that works pretty well with Maya's subscription licence, and it fits in with the way the industry is moving right now.

But whilst Maya is iterating on its core tools bit by bit, we're seeing Autodesk stablemate 3ds Max get a full rung of updates with a wholly new 2017 edition – these include improved viewport performance, the Autodesk Raytracer Renderer, Object Tool enhancements and much more. We'll have a lot more information (as well as the inside track from Autodesk itself, and Beta testers) next issue, so be sure to pick up issue 95 of **3D Artist** for an in-depth analysis.





Software shorts

Bringing you the lowdown on product updates and launches

V-Ray 3.3

The newest update to V-Ray brings a node-based VR system, GPU rendering speeds and over 200 3.x updates to NUKE, Maya and 3ds Max. The VR system is implemented via two new cameras that cover spherical and stereo cube maps, and lets artists transmit render-ready assets from NUKE to 3ds Max and Maya with 100 per cent consistency.

Amplify LUT Pack

This Unreal Engine 4 pack is comprehensive and varied – once you download it, you can apply over 200 high-quality LUTs to either 2D or 3D projects by using the Amplify Color plugin. There are presets in there for everything from exposure and tint adjustments to elaborate film colour grading or film-based filters.

Cycles Materials Vault

The Cycles Material Vault is a library of over 100 high-quality Cycles materials made specifically for Blender. Instead of booting up the program and having to create materials from scratch, the CMV will enable you to import materials into your project, assign them to your selected object(s) and simply render at will.

DID YOU KNOW? Autodesk recently acquired Solid Angle – taking over Arnold, the high-profile rendering software

Job Director/writer

Website hazfilm.com

Location London/LA

Education City University London, Media Communications Systems

Biography A visual effects creative and film-maker in the motion pictures industry, Dulull has been nominated for several Visual Effects Society awards for his VFX supervision roles. He transitioned into writing/directing with his sci-fi short 'Project Kronos' (**vimeo.com/65014898**) – a viral success that earned Dulull immediate recognition for his hands-on approach to VFX.

Portfolio Highlights

2016 *The Aliens*
The Division
2015 *Poldark*
2014 *SYNC*
I.R.I.S
2013 *'Project Kronos'*
2011 *Planet Dinosaur*
'Fubar Redux'
2010 *Prince Of Persia: The Sands Of Time*
2008 *The Dark Knight*

Hasraf Dulull

Director/writer

HaZ explains why communication is always the key to landing feature-film contracts

You'd never know Hasraf 'HaZ' Dulull works on a pretty tight budget from the films he puts out. You'd never know he managed to win a feature-film deal from Hollywood studios from a project he funded totally by himself. Why? Because of the tricks HaZ uses – the creative solutions he manages to conjure up when he imposes these limits on himself. Some people would call that foolish, but if you look at the success this young Londoner has established for himself, you can't help but admire him.

"You know, I didn't even release 'Project Kronos' for the purpose of [it] becoming a viral thing," HaZ explains. "I made it because I was working as a VFX advisor on documentaries (for the BBC, Discovery Channel, History Channel) and so my mind was already in that place, you know? During the day, I'd be in the editorial bay, sitting with the director, the showrunner, the producers and that, getting immersed in that world."

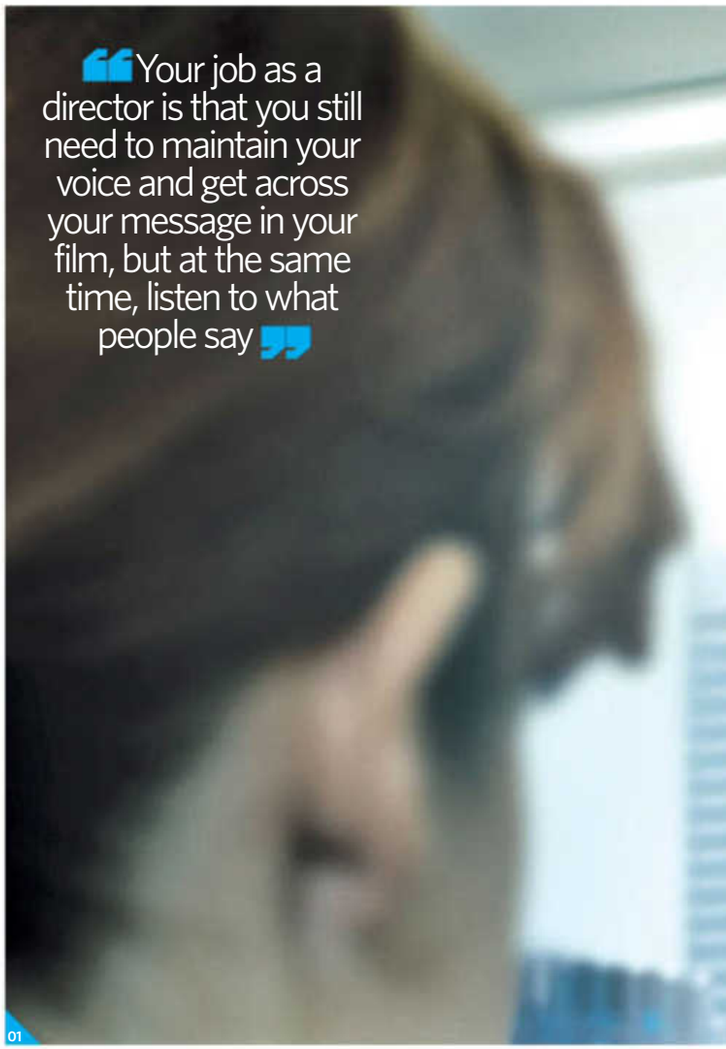
After spending his day job working as a VFX supervisor on various TV documentaries, HaZ was inspired to put something similar together himself. He used a month-by-month subscription to Adobe's Creative Cloud package to work on every aspect of his pet project, whilst skimming a small percentage off each paycheque to fund production.

"I uploaded the trailer and overnight it got Vimeo Staff Pick, and I was contacted by agents from all over the world. There were Hollywood agents like 'who reps you? Do you want us to rep you?' And I was like 'what do I say?' [Laughs]"

That was the start of HaZ's directing career – he chose his manager (Scott Glassgold of Ground Control, who specialises in representing VFX artists-turned-directors) and quickly had to learn a whole new set of skills. Glassgold told HaZ to re-edit the film and, cautious of sacrificing creative control, HaZ tentatively set about making the pages and pages of changes to 'Kronos'. "That was the best decision of my career: [Glassgold] later told me that these were notes from *big* studio executives... but he didn't want to tell me that because of the pressure!"

For a creative like HaZ, who had for so long been working on other people's work, getting creative control over his own *big* project could have taken him on an ego trip, but his roots helped him stay humble. "One of the things I'm still learning as a director is how to maintain consistency in feedback and in your own ideas," he explains. "Your job as a director is that you still need to maintain your voice and get across your message in your film, but at the same time, listen to what people say."

> "There were Hollywood agents like 'who reps you? Do you want us to rep you?' And I was like 'what do I say?'"


"Your job as a director is that you still need to maintain your voice and get across your message in your film, but at the same time, listen to what people say"

01

02

01 *SYNC* was pitched after the Sony email hack; it took immediate notice of the film

02 Directors from a VFX background tend to direct green screen actors better

03 HaZ's London upbringing is visible in the grounded reality of sci-fi he produces

> This is a people industry: it doesn't matter how pretty the pixels you put on the screen are... there are always people behind them

04 *SYNC* featured local actors HaZ knew personally, which helped keep costs down

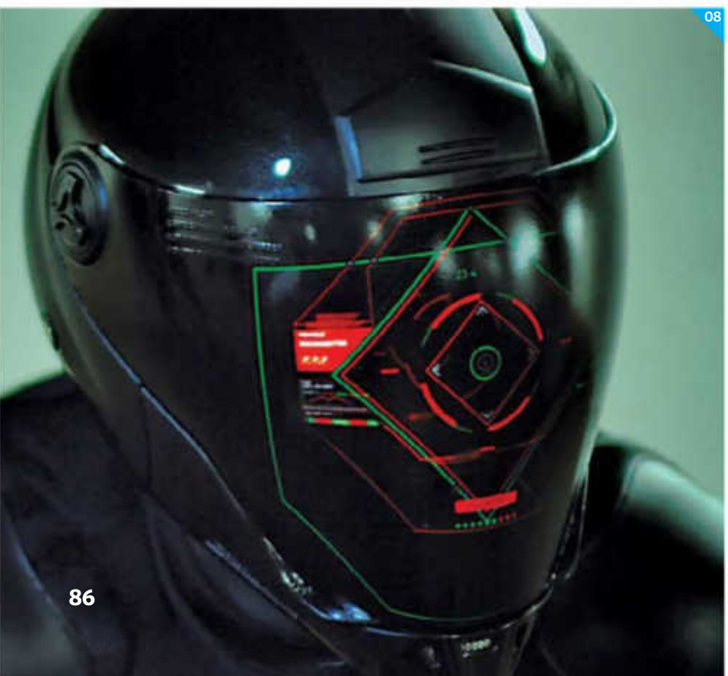
05 HaZ's insistence on promoting his crew makes him a popular project leader

06 After funding his own projects, HaZ is now being funded for future projects

07 The supervisor-turned-director is a transition that's becoming more common

08 Practical VFX knowledge helped *SYNC* achieve that polished sci-fi look

09 VFX supervisor experience is the perfect foundation for working on VFX-heavy films



Starting a career with NUKE

HaZ started his career making FMV cutscenes for videogames, primarily using compositing skills

"I came from a NUKE background, being a NUKE compositor," HaZ tells us. "I have 15 years in the VFX industry being a compositor using this software I'm used to (well, it was [originally called] SHAKE when I first started)." HaZ revealed to us that he initially entered the videogame industry because, when he graduated university in 2001, there weren't exactly a lot of jobs in cinema and film for compositors going!

Being creative with the cloud

HaZ earned a tech sponsorship through Adobe CC and Blackmagic for 'Project Kronos' as the companies saw a mutually beneficial opportunity

"As an independent artist, I didn't want to go and buy Final Cut upgrades," explains Haz, "and I didn't want to fork out £3,000 for a NUKE licence..." That's when Adobe turned up with its CC subscription-based suite and showed HaZ what it could do in a demo at the Prime Focus studio (which is where HaZ worked at the time). "The more I used it, the more I realised I could tailor my workflow to the Creative Cloud!"

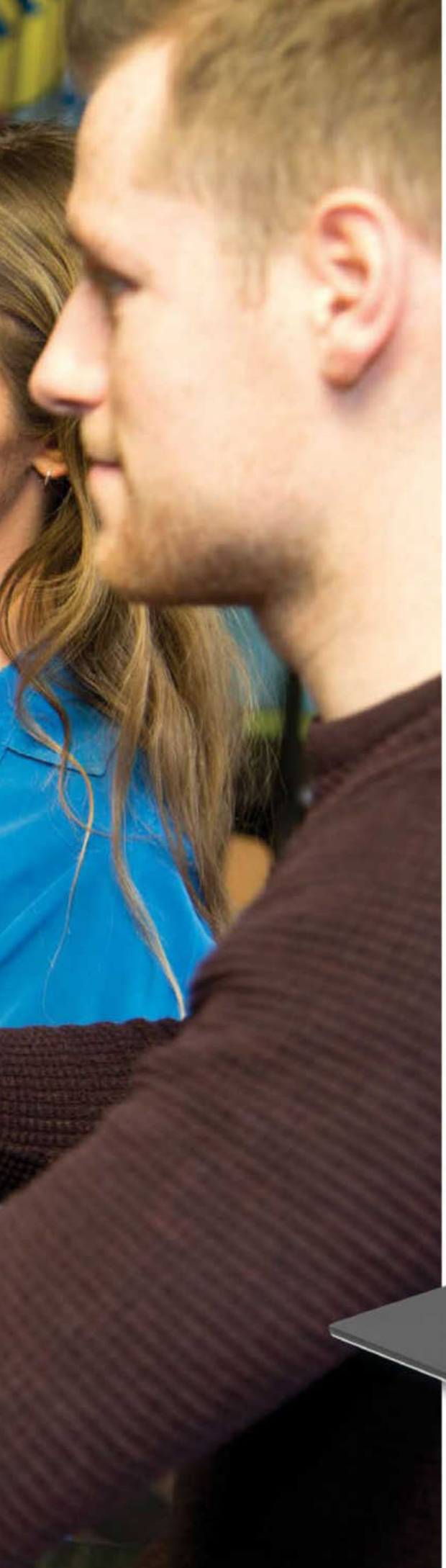
HaZ has come so far on his personal projects because he knows how to get himself out there: rather than just post his work and be done with it, he contacts the owners of the software he worked in (he got a tech-sponsorship deal through Blackmagic/Adobe and HP this way – no mean feat!). HaZ makes a point of going to events and being seen by key influencers. As he puts it "Skype can only get you so far".

"This is a people industry: it doesn't matter how pretty the pixels you put on the screen are or who's clicking those pixels – there are always people behind them," he says. "Coming from an artist's point of view to being a director, I've realised one of the most important tools in this industry is communication. Learning to listen, rather than just dictating, is *vital*."

Despite his hands-on approach to his work, HaZ still gets involved on the ground during any project he's involved in. "Film-making is a collaborative process," he says. "I get involved with Houdini artists, or people that use Substance or Maya, and I can say what I need done, when I need it done for and what my budget is for it. I learned as a VFX supervisor you need to be clear. Artists want clear notes, a clear brief. But they want the flexibility to be able to bring their ideas to the table, too. It means they feel more connected with the project, that they can put their fingerprint on it, and it removes ego."

It's this kind of understanding that got HaZ to where he is today: we're seeing more and more VFX professionals become directors of triple-A Hollywood blockbusters, like Tim Miller of *Deadpool*, Gareth Edwards of *Rogue One: A Star Wars Story* and Cedric Nicolas-Troyan of *The Huntsman: Winter's War*. It's beneficial for the staff on HaZ's projects, too: many of the team that worked on HaZ's most recent film, *SYNC*, found their way into studios like MPC, working on big features. He told us in the interview he was keen to bolster as many CG showreels as possible. "It's a mark of the industry really starting to understand how important CG and VFX is becoming," explains HaZ, "and, let's be honest, it's cheaper for studios to get people like us in because we know the language involved in shooting special effects, we know how green screens work, we know what actors need to be doing in these situations. We don't have to keep going back and reshooting expensive scenes and rendering out shots because we've been working in it, we understand it, and – most importantly – we respect it."

HaZ is currently working on a variety of projects – the adaptation of his 'Project Kronos' short, a VR project that's currently under wraps and three major films that recently got optioned. It's going to be an exciting couple of years for HaZ...



Power up your 3D renders

Fly through the most technical and demanding CG tasks with Dell Precision 15 5000 Series workstations and Windows 10

If you're into 3D design, you already know that you need a powerful computer to handle everything you throw at it, from working with high-poly scenes in 3ds Max to rendering out a long animation in Maya. Improved processing power and professional graphics allow you to achieve levels of unprecedented efficiency, especially if you're used to working on a dusty old machine at home, and both of these can be found in professional workstations like the Dell Precision 15 5000 Series.

Mobile Intel Xeon processors give you the confidence to push complex scenes through mental ray or Iray without needing to factor in hours of render time, and NVIDIA Quadro graphics cards are powerful enough to breeze through GPU rendering tasks. Quality comes first in CG, but speeding up the process can't hurt, can it? Dell Precision 15 5000 Series workstations have been designed with your busy workflow in mind and house enough high-end tech to make your life easier. If you're a student, a busy freelancer or a studio looking to diversify, you need to know you're making the right hardware choice.

EASY TO PROCESS

As you know, the CPU is the nucleus of any computer. What you won't find in normal PCs are processors with high clock speeds that have been specifically developed for the most intense computing tasks inherent in the 3D pipeline – much like the mobile Intel Xeon CPU sat at the heart of Dell Precision 15 5000 Series

Why choose Windows 10?

Microsoft's new OS offers all the flexibility you need

Windows 10 is a significant step towards your operating system integrating seamlessly into your busy creative schedule. Sporting everything you could ever need to keep yourself organised and working at maximum efficiency, it's an operating system with your personal needs at heart.

By taking advantage of exciting new functions like the Snap feature, which allows you to snap up to four different apps into the four corners of the screen, you'll discover new ways to streamline your workflow. Approaching deadline? Snap your emails to the corner of the screen and remain client-facing, while still getting the job done in Photoshop. Illustrating from reference? Snap your web browser and illustrate away without the need for switching between windows. As creatives, we're always looking for ways to improve our workflow – features like this one have been built with this need for exciting, unimpeded productivity in mind.

On top of this, Cortana is always on hand for whatever you need, from managing your personal calendar at crunch time, to digging out old designs you thought you'd forgotten about, to searching the web for all the inspiration you need to unleash your creativity.

So why choose Windows 10? It's simple – whatever your discipline, whatever your interests, Windows 10 offers the definitive 21st Century solution for creatives with busy work lives, and busy social lives too. Blending typical Microsoft ease of use with new, forward-thinking productivity aids like Cortana, the Snap feature and much more, Windows 10 is the perfect way to augment your creative life, keeping you organised while allowing you to let your imagination run as wild as you need it to.

workstations. With a clock speed of 2.8GHz, the Intel Xeon E3-1505M v5 is built on Intel's latest architecture, Skylake. This is a brand new processor for a brand new age of power and productivity in CG.

How many times have you come up against a massively subdivided asset that slows your system down? How many times have you attempted to create simulations or use intensive modifiers in 3ds Max, only to find that your computer can only manage it at a crawl? By becoming a part of the workstation family, you can attack any complex scene with confidence, and at the heart of this is this new generation of Intel Xeon processors.

rendering. It can easily support your CPU as it chugs through a complex underwater scene in Maya or materials and lighting rigs in NVIDIA Iray. If you've been to any conferences like SIGGRAPH over the past 12 months, you might've seen Iray's incredibly realistic materials and lighting in action – this is all part of NVIDIA's wider ecosystem, that includes the powerful Quadro M1000M.

But the need for professional GPUs doesn't stop there. For one, professional cards, like those in the NVIDIA Quadro range, are fully certified for use with popular 3D programs published by well-known vendors like Autodesk and Dassault Systèmes, whereas gaming cards aren't. This means higher levels of support from software vendors if you go for a professional GPU and a better optimised experience overall – if you're a Maya or 3ds Max user, your preferred app will perform better when coupled with a professional GPU. Pro cards like the NVIDIA Quadro M1000M will significantly outperform their gaming equivalents when used for 3D work. They're also extensively tested to ensure that they can perform for hours without any down time.

> "It's always useful to have a second monitor running, as it allows you to keep active while your machine is idling during a render"

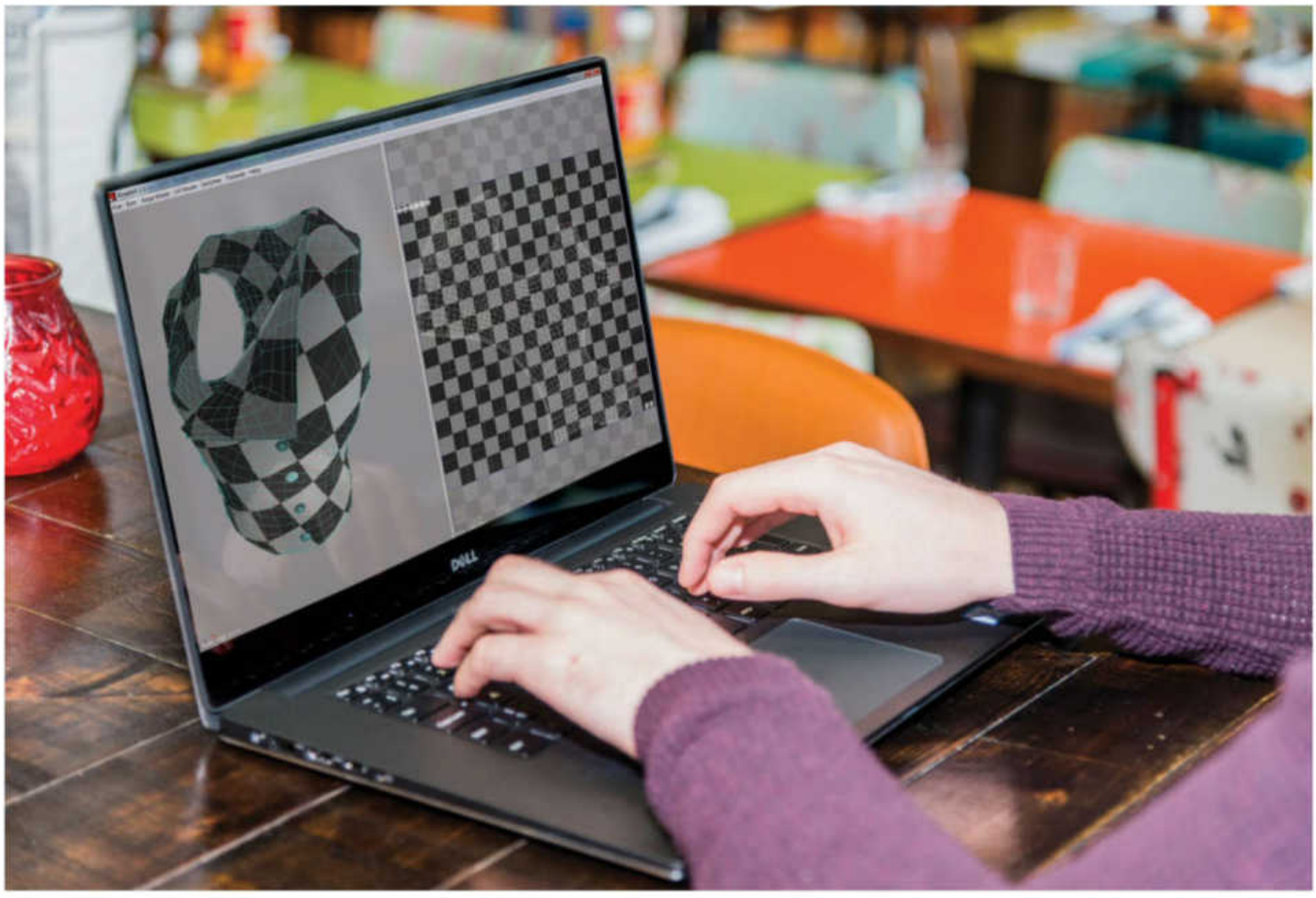
GO PROFESSIONAL

It's amazing how many artists still use gaming cards in their workstations. The thing is, what a lot of artists don't realise is that professional GPUs, like the NVIDIA Quadro M1000M that comes as standard in Dell Precision 15 5000 Series workstations, have been built to cope with the high demands of CG work. Their power consumption is lower than normal retail cards, meaning you can rely on its pace and power for hours on end – perfect at crunch time.

These graphics cards are built on Maxwell architecture – NVIDIA's most advanced GPU architecture to date. They also come with 2GB of VRAM and boast 512 CUDA cores, which is perfect for those of you that are getting into GPU

QUALITY IS KEY

And as if performance and low power consumption weren't enough, modern professional GPUs like the NVIDIA Quadro M1000M were designed with running multiple monitors in mind. It's always useful to have a



Style and substance

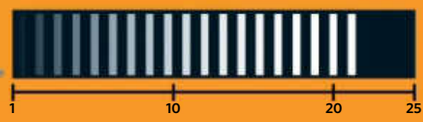
It's not enough for a mobile workstation to look good – performance is where workstations prove their worth, so we put the Dell Precision 5510 to the test

PERFORMANCE COMPARISON

SPECVIEWPERF 12.0
AUTODESK MAYA FACE-OFF

DELL PRECISION 5510

• Intel Xeon E3-1505M v5 @ 2.8GHz • NVIDIA Quadro M100M • 16GB DDR4 RAM • 512GB SSD • Windows 10



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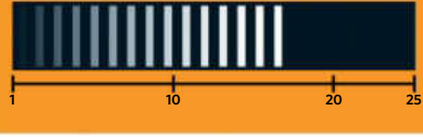
DELL PRECISION M4800

• Intel Core i7-47930 MX @ 3.0GHz • NVIDIA Quadro K2100M • 32GB DDR3 RAM • 1TB HDD • Windows 7



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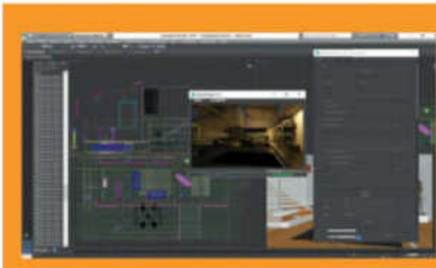


CINEBENCH 15
OPENGL
40.05fps

3DS MAX
UNDERWATER RENDER
04:06

second monitor running, as it allows you to keep active while your machine is idle during a render or assigning materials to a mesh. Organisation is key in 3D, and getting a new screen is a tried and tested way to keep your workspace clear.

Whether you're painting textures, fiddling with FK and IK handles in Maya or setting up lighting for an arch-vis scene in 3ds Max, resolution is important. It goes without saying that, nowadays, anything less than full HD (1920x1080) just won't do. Why not dream bigger? Dell Precision 15 5000 Series workstations sport 4K UHD displays – that's a resolution of 3840x2160 pixels. The term '4K' has been bandied around for ages, but now you can finally see it in action on a screen smaller than 60". Plus, it's touch sensitive, meaning you can have all of the haptic feedback of a tablet but with the knowledge that the machine in your hands boasts the power of a workstation.

This hunt for unfathomable display quality can extend further. You've always got the option to pair Dell Precision 15 5000 Series workstations with a larger external monitor, like the Dell UltraSharp UP3216Q – a 32-inch behemoth that boasts PremierColor, ensuring that your material presets and textures are exactly the tones you want, every time. When it comes to screen real estate, bigger is better – by getting those intricate environments, high-poly assets or game engine experiments up on a display like the Dell UltraSharp UP3216Q, you may as well be in the scene yourself.

A NEW WINDOWS

But what use is all of this precision and power without a solid backbone to hold it all together? Luckily, Dell workstations are powered by Windows 10, which has been designed to work hand in hand with your favourite 3D software like Autodesk Maya or 3ds Max. Windows 7 has been pretty much the standard in the 3D world for a long time, and Windows 8 followed with a sleek, app-based approach. Windows 10 combines the forward-thinking style of Windows 8 with the stability and ease-of-use of Windows 7, resulting in an intuitive, responsive operating system that is more than ready for anything you throw at it.

Additionally, it's bolstered by several new features that will become a natural part of your workflow. There's Cortana; your personal assistant for Windows 10. Just say "Hey Cortana", followed by whatever you're after (online references, documents and more) and it'll be there in seconds. There's also the Task View button, allowing you to access all of your open windows in a neat and tidy workspace – this is perfect if you're an artist that uses multiple tools in your workflow. Then there's the Snap feature; just drag any windows you want to the corners of the screen and they'll snap in place, allowing you the freedom to create your own workspace and keep on top of your busy work life. All of these features combine to build an OS that's perfect for a 3D artist like you to thrive in.

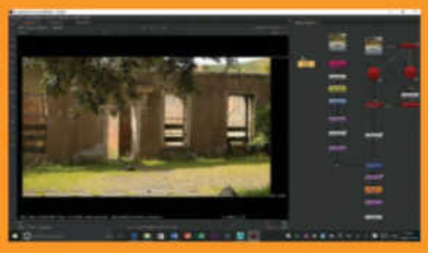
Expert opinion: Paul Champion

The VFX trainer and freelancer measures the Dell Precision 5510's post-production prowess

"If you are looking for a viable hardware solution for everyday post-production tasks such as green screen, colour match and retouching, you need more than the average office notebook screen.

"Dell has delivered an exceptional 15.6-inch, 4K UHD multi-touch backlit display with incredible viewing angles, a large colour gamut, great brightness and contrast levels and colour accuracy that makes it an ideal choice for compositing.

"For intensive shots it doesn't disappoint either, blasting through 4K footage stabilisation, handling roto and paint-heavy shots with ease and making short work of tracking. Shots I have created in the past that NUKE 9 has struggled with were little obstacle. I ran identical camera solves on both my brand new desktop workstation and the Dell Precision 5510, and when the Dell finished first

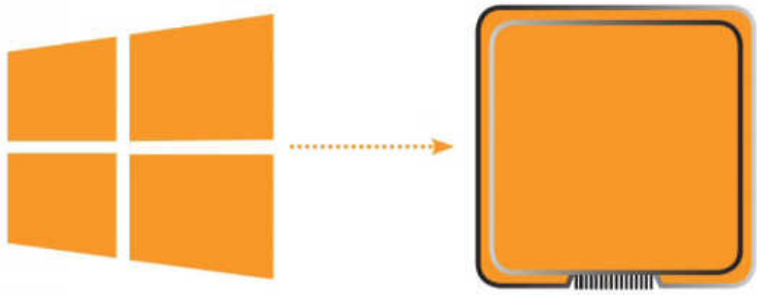


I started to seriously re-evaluate my new desktop purchase.

"Windows 10 brings another layer of productivity by offering native support for Thunderbolt 3. At 40 GB/s transfer speeds anyone transferring large amounts of data or footage, such as animators and compositors, will recognise the importance of faster rates. The other advantage for me is multi-touch. As a trainer I often have to point out tools and menu items – now I just tap the screen."

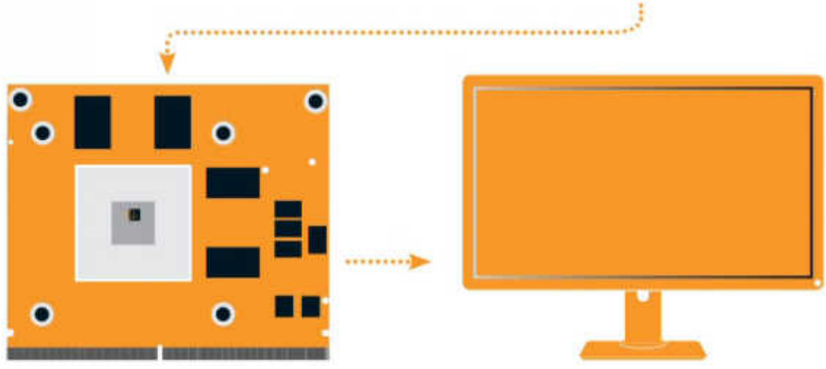
Supercharge your 3D workflow

Unleash your creative potential today by upgrading to a professional workstation and Windows 10



WINDOWS 10 The handy Snap feature, Cortana's upgraded functionality and Task View will keep your workspace easy to navigate and far more efficient to work with.

INTEL XEON E3-1505M As a 3D artist, you should feel confident enough to work with even the most extreme scenes. With Intel Xeon processors, you can.



NVIDIA QUADRO M1000M 2GB of GDDR5 VRAM. 512 CUDA cores. Unimaginable performance resides in professional graphics solutions like this one.

DELL ULTRASHARP UP3216Q No more squinting at 3D viewports – get yourself hooked up to a second screen and experience your scenes as if you're really there.

TIME SAVED Even more so than in most other creative industries, working without delays in visual effects is paramount. Every second you waste is money down the drain. Upgrade to a professional workstation today and you'll be amazed at the speed and quality of its performance. This incredible combination of power and portability means that you can operate at maximum efficiency wherever you are, safe in the knowledge that every shot you deliver is the very best it can be.

Expert opinion: Gordon Dunn

The trainer and freelance artist gets to grips with Windows 10

"While a book shouldn't be judged by its cover, it has to be said that the Dell Precision 5510 does have a great looking cover. Its dark aluminium finish and skinny design serves as a good introduction for what is a textbook example of a well manufactured product. As an animator and VFX trainer it suits my requirements of being easily portable and robust for visiting clients and students while packing plenty of punch to cope with demanding work.

"For animation, viewport playback performance with complex rigs and several characters is important. Features such as Vertex Caching and drawing on the GPU for Parallel Rig Evaluation with Maya 2016 helps accelerate playback to view in real time. In the shots I've been working on, this hasn't caused the laptop to break much of a sweat.

"To assist in visualising my animations and often with tutoring I rely on the Grease Pencil tool. Thanks to the multi-touch screen, when I don't have my Wacom or just need to make a few marks, I really like that I can just use my finger directly on screen. The 4K UHD touchscreen is sensitive and responsive, and uses almost the whole of the screen.

"I found the 4K resolution of great use, especially as it helped me to improve my workflow by using the display as a dual monitor. This enables me to have high-res reference footage playing while I am animating, and I can quickly produce playblasts for final comparisons utilising the power of the Intel Xeon processor."

Images of the month

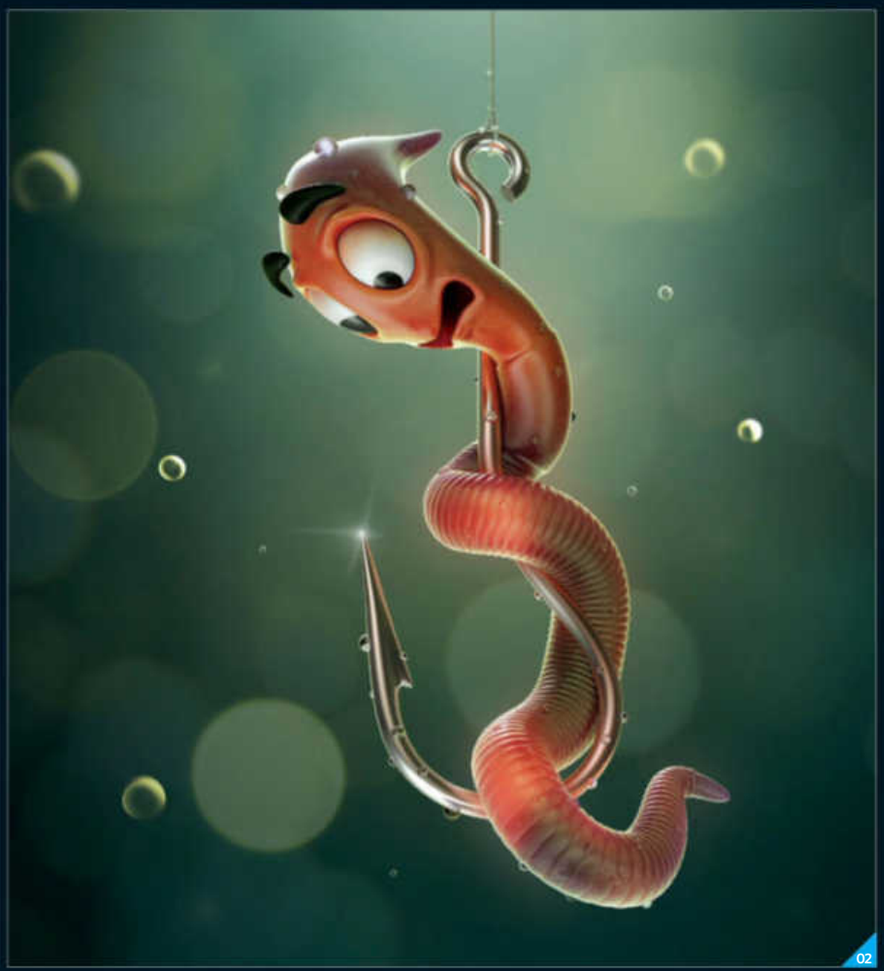
These are the 3D projects that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

01 Macro Of Lady
by Jafar Dashti Nezhad
3DA username
Jadan
Jafar Dashti Nezhad says: "After seeing lots of nature macro photography I decided to try it in 3D. Analysing the anatomy, mood and colour of references was key to my success."
We say: *This is a superb image overall, with great attention to detail. It really shows an understanding of depth of field and other wildlife photography techniques.*

02 The Worm's End
by Alexandr Novitskiy
3DA username
Tigersfather
Alexandr Novitskiy says: "Characters are new for me – I'm used to creating hard surfaces. It was a little study where I tried to create a simple cartoon character with emotion."
We say: *We've been fans of Alexandr's work for a while, but this is real departure from his normal style – this is a fantastic example of an emotive character and we love the translucency of the worm's body.*

03 Cobra In Studio
by Grigorii Kliver
3DA username
AirJ
Grigorii Kliver says: "This model was done for an automobile contest. I used 3ds Max, Corona Renderer, HDR Light Studio, ZBrush and Photoshop."
We say: *Brilliant materials and attention to minute details like the dials on the dashboard make for a fantastic automotive scene. Grigorii has clearly paid a lot of attention to good reference materials to complete his image.*

04 Tell Me Of The Rain
by Artem Lazarev
3DA username
Lazarev Artem
Artem Lazarev says: "I created this work for a competition. I mixed classic and modern design elements that give the room a unique look. Warm light from the candles destroys the dark, rainy atmosphere, creating the necessary comfort. I like it and I hope you will like it too."
We say: *We certainly do like it! Artem's combination of hard-surface and cloth elements work together really well in this scene.*



Corona Kitchen Emotional Detail

by Lorenzo Troiano
3DA username lollo_O
Lorenzo Troiano say: "This image was born from the desire to try Corona in a daily life situation. The lighting was done with a single large pane on the left because I wanted to create an emotional image with strong contrasts."
We say: *Lovely depth of field, strong colours, food… this image has it all. We're fans of Corona due to the lovely visualisations you can achieve with it.*

Virus In The Window **by Rafael O'Ryan Squella**

3DA username Rafaoryan
Rafael O'Ryan Squella says: "The goal was to make a cartoon of a nasty virus looking out the window waiting for someone. The concept was by Luis Ramirez and Alejandro Calleja."
We say: *There's so much detail in this scene, from the blood vessels in the virus's eye to the spiky nature of its tongue. Rafael has accomplished so much with one character that we had to feature it.*

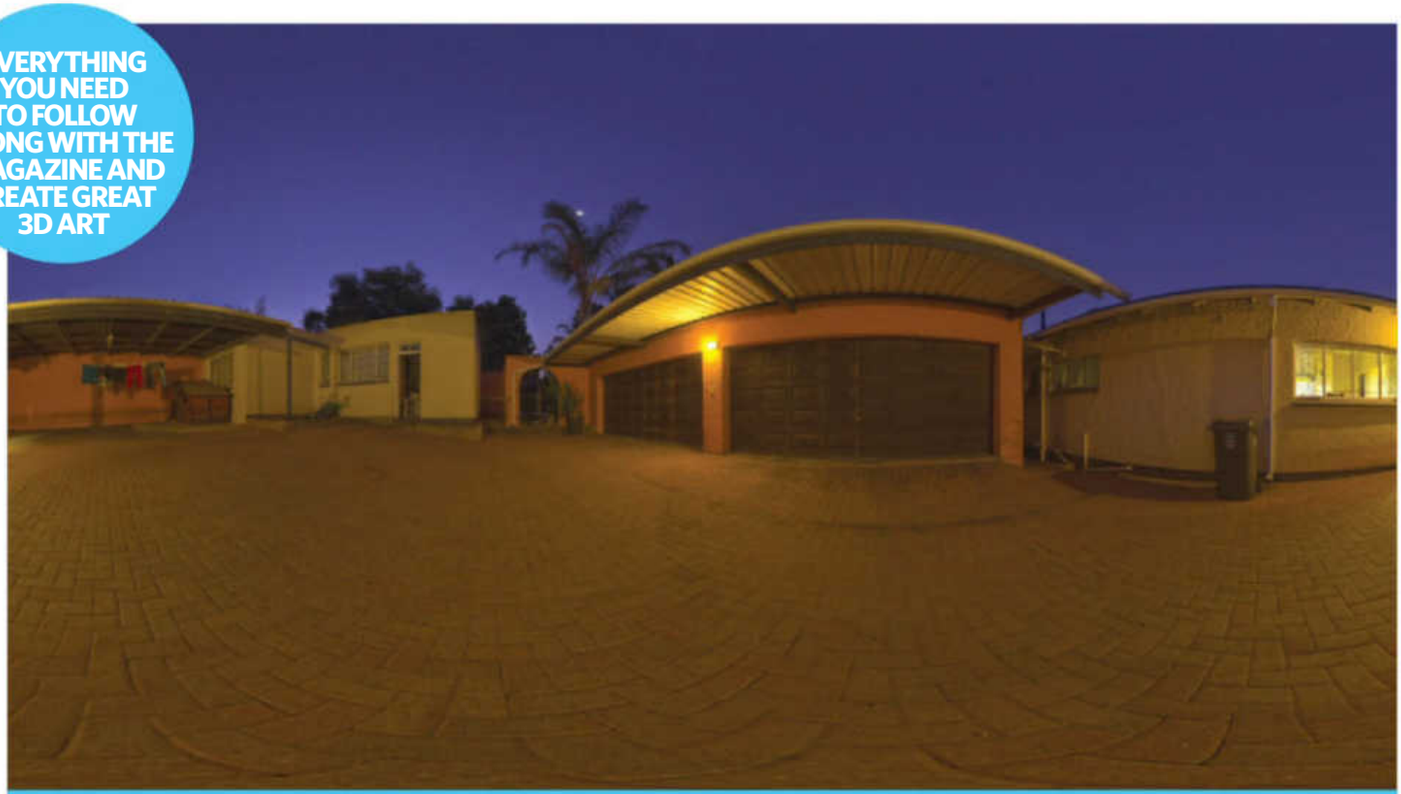
Steampunk Royal Gauntlet

by Tuna Unalan & Onur Can Cayli
3DA username tunalan & Onur cayli
Tuna Unalan & Onur Can Cayli say: "Onur was inspired by orientalism and steampunk. Onur inspired Tuna to create a royal, but worn look from a battle."
We say: *Tuna and Onur have done well to work to their own self-imposed brief – with a hint of steampunk design that looks regal, but worn at the same time.*

YOUR FREE RESOURCES

Log in to **filesilo.co.uk/3dartist** and download your 3D resources **NOW!**

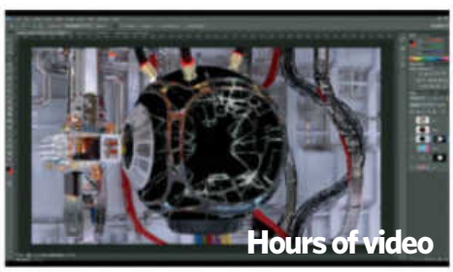
EVERYTHING YOU NEED TO FOLLOW ALONG WITH THE MAGAZINE AND CREATE GREAT 3D ART



5 HDR IMAGES FROM HDRI HAVEN

3 premium CGAxis models

25 3DTotal textures



THIS MONTH'S COMBINED RESOURCE SIZE: 6GB

YOUR BONUS RESOURCES

ON FILESILO THIS ISSUE, FREE AND EXCLUSIVE FOR 3D ARTIST READERS, YOU'LL FIND OVER 6GB OF RESOURCES, INCLUDING...

- 5 premium HDRIs in a number of different sizes courtesy of HDRI Haven
- 3 amazing 3D models from CGAxis for you to use in your own work
- 25 awesome textures from 3DTotal
- Hours of quality video tuition from our tutorial experts
- A huge selection of images and scene files to help you follow along with our tutorials

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Green open padlocks show the issues you have accessed. Red closed padlocks show the ones you need to buy or unlock

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02 If you happen to be a print subscriber, you can easily unlock all the content by entering your unique Web ID. Your Web ID is the eight-digit alphanumeric code that is printed above your address details on the mailing label of your subscription copies. It can also be found on any renewal letters you receive.

03 You can access FileSilo on any desktop, tablet or smartphone device using any popular browser (such as Safari, Firefox or Google Chrome). However, we recommend that you use a computer to download content, as you may not be able to download files to your phone or tablet.

04 If you have any problems with accessing content on FileSilo, or with the registration process, take a look at the FAQs online or email **filesilohelp@imagine-publishing.co.uk**.

NEED HELP WITH THE TUTORIALS?

Having trouble with any of the techniques in this issue's tutorials? Don't know how to make the best use of your free resources? Want to have your work critiqued by those in the know? Then why not visit the **3D Artist** Facebook page for all your questions, concerns and qualms? There is a friendly community of fellow 3D artists to help you out, as well as regular posts and updates from the magazine team. Like us today and start chatting!

facebook.com/3DArtistMagazine

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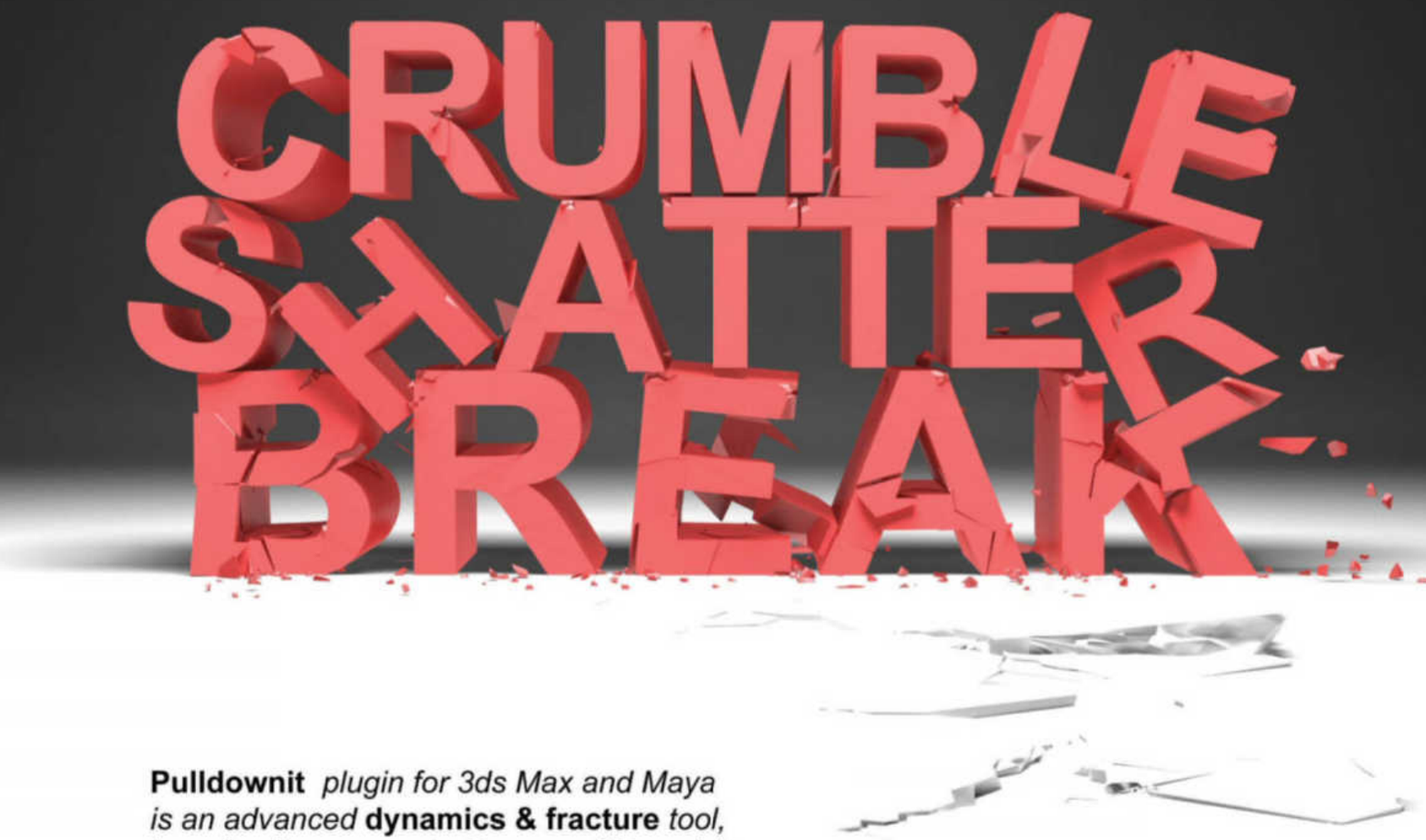
Pulldownit 3.7

destruction plugin



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